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Moderated Poster Presentation

Coronary Artery Disease

Characteristics and medical management of Indian stable angina patients: The STable Angina obseRvational (STAR) Registry

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Background: Coronary Artery Disease (CAD) is highly prevalent in our population.

Aims and objectives: The STable Angina obseRvational Registry (STAR registry) aimed to understand the current diagnosis, management and interventional therapy pattern of stable angina (SA) subjects in an Indian population.

Methods: The STAR Registry is a prospective, multicenter, observational study that enrolled 2,079 subjects at 131 sites in India. Subjects had a provisional diagnosis of SA within 3 months of enrollment. Demographics, medical history, diagnostic tests and results, and drugs prescribed were collected. The Morise and Jalisi pretest scoring system was used to define low, intermediate or high probability of significant CAD related to outcomes.

Results: As in the Euro Heart Survey and FAME-2 Study, the STAR Registry population had significant risk factors and comorbidities with diabetes standing out prominently (see table)

The probability of CAD was low for 7.2%, intermediate for 41.7% and high for 51.1% of subjects.

Rates of drug consumption were as follows: statins, 86.1%; β-blockers, 70.3%; ACE inhibitors/ARBs, 64.5%; antiplatelet drugs, 87.7%; diuretics, 19.6%; and nitrates, 45.7%.

Tests conducted included ECG, 92.8%, baseline echocardiogram, 43.8%. The rate of ischemia assessing tests, like exercise stress test, 11.8%; and CT/angiography, 7.5% were low.

Conclusion: As in studies of Western populations, we observed high rates of co morbidities and risk factors. Medical management rates were high, but diagnostic work up was low. This may have significant influence on the outcomes especially in high risk probability group.

Risk profile	STAR India Study	Euro Heart Survey	FAME-2 Study	
	N=2079	N=3779	PCI = 447	OMT = 441
Age	57.0 ± 10.5	61 ±11	63.5±9.3	63.9±9.6
Male %	62.1% (1291)	58%	79.6%	76.6%
Diabetes	39.7% (825)	18%	27.5%	26.5%
Hypertension	69.2% (1438)	62%	77.6%	77.8%
Hyperlipidemia	46.8% (974)	58%	73.9%	78.9%
Current smoker	14.0% (291)	23%	19.9%	20.4%
Family history CAD	21.1% (438)	43%	48.3%	46.9%
PVD	4.1% (85)	7%	9.6%	10.7%
CVA/TIA	4.7% (98)	5%	7.4%	6.3%
BMI	26.6±10.6	28±5	28.3±4.3	28.4±4.6
CCS class I	25.1% (522)	39%	18.35%	22.3%
CCS class II	63.7% (1324)	49%	45.6%	44.8%
CCS class III	10.8% (225)	12%	17.9%	14.8%

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CD40 gene -1(C/T) polymorphism in coronary artery disease

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Background: CD40 gene is located on chromosome 20 (q12-q13.2), belonging to the tumor necrosis factor superfamily and is widely expressed on endothelial cells, smooth muscle cells, monocytes, macrophages, dendritic cells, fibroblasts etc. A C/T SNP in the 5' untranslated region of CD40 located at the -1 position within the kozak sequence (rs 1883832) is found to be associated with higher plasma levels of sCD40L and indicates an increased risk of CAD. Hence, we studied CD40 polymorphism as it may be a potential marker to identify and manage atherosclerosis.
Aims and objectives: To find the association of CD40 gene (-1 C/T) polymorphism and coronary artery disease.
Methods: CD40 gene polymorphism was studied in 80 angiographically proven CAD patients, out of which 64 were unstable angina patients and 16 were acute MI patients. CD40 gene (-1C/T) polymorphism was studied by PCR-RFLP using standard primers and conditions.
Results: The CC genotype and C allele frequency of the CD40 gene is significantly higher than CT and TT genotype and T allele in both unstable angina patients and MI patients. The frequency of CC, CT and TT allele in unstable angina was 36/64 (56.25%), 19/64 (29.68%) and 9/64 (11.25%) respectively with p-value < 0.00. The frequency of CC, CT and TT allele in acute MI was 8/16 (50%), 7/16 (43.75%) and 1/16 (6.25%) respectively with p-value < 0.01.
Conclusion: Our study suggests that the CD40 (-1C/T) polymorphism was associated with increased risk of coronary artery disease. The T to C change in the CD40 (-1C/T) gene carries the risk of CAD.

Comparison between the effect of atorvastatin and rosuvastatin on oxidative stress, in patients with coronary artery disease and the role of CYP3A5 gene polymorphism on the same

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Background: Thrombolytic and revascularization therapies, along with statins have formed a mainstay in treatment and prevention of CAD and ACS. Among the statins, rosuvastatin has been shown to be more efficacious than atorvastatin in many studies. Gene polymorphisms that can possibly affect the metabolism of statins and thus their efficacy is an area of increased interest.
Aim: To compare the effects of atorvastatin and rosuvastatin with regards to levels of serum lipids and oxidative stress markers in the context of CYP3A5 polymorphisms.
Methods: 152 patients were screened according to our inclusion and exclusions criteria and 60 statin naïve patients were chosen as our study group. The 60 were randomized into two groups of 30 each and an age matched control group of 30 was also selected. One treatment group was chosen to receive atorvastatin and the other received rosuvastatin. Baseline lipid profiles, oxidative stress (MDA, FRAP, GSH) markers and CYP3A5 polymorphisms were recorded. The study groups were followed up at 4 and 8 weeks where repeat blood tests were done. At the end of 8 weeks, the data collected was compiled and statistically analyzed.
Results: Both atorvastatin and rosuvastatin after a short follow up of 8 weeks showed significant effects on improving the lipid profiles and decreasing oxidative stress markers (MDA, FRAP). Rosuvastatin showed a significantly higher propensity to increase antioxidant levels (GSH). The improvement in Oxidative stress markers is independent of the action on the lipid profile in a short term follow up. Genetic polymorphisms had no significant effects on lipid profiles or oxidative stress markers.
Conclusions: Both Atorvastatin and Rosuvastatin are equally efficacious in improving lipid profile and Oxidative stress levels. The CYP 3A5 polymorphism has showed no significant effect on the action of these drugs.

CYP 450 2C19 polymorphisms in Indian patients with coronary artery disease

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Background: Dual antiplatelet therapy is cornerstone in the management of acute coronary syndromes (ACS) and prevention of stent thrombosis (ST). Genetic polymorphisms in CYP2C19 gene involved in hepatic activation of clopidogrel leads to clopidogrel non-responsiveness and may influence clinical outcomes. These polymorphisms in CYP2C19 gene and their impact on clinical outcome in coronary artery disease (CAD) have not been studied in Indian population.
Methods: We studied 110 consecutive patients (mean age 55.7 ± 10.7 years; 90% male) taking clopidogrel with angiographically proven CAD for various genetic polymorphisms in CYP2C19 gene.

Table 1 – Plasma lipid concentrations and markers of oxidative stress before and after statin treatment.

Marker	Control	Group 1 (Atorvastatin 40 mg)		Change (%)	Group 2 (Rosuvastatin 10 mg)		Change (%)
		Before treatment	After treatment		Before treatment	After treatment	
TC	151.67±24.71	180.77±26.29	131.83±27.46	27%	190.20±43.93	109.83±34.85	42%
LDL-C	99.07±28.65	119.00±22.26	69.77±24.82	41.3%	124.00±37.19	83.77±26.76	32.44%
HDL-C	40.43±8.75	36.60±5.58	37.93±6.61	3.6%	36.43±7.74	39.87±5.80	9.4%
TG	121.63±38.65	128.37±56.55	117.60±49.32	8.3%	147.40±79.58	117.97±54.38	19.9%
VLDL	25.30±10.50	25.30±10.50	23.47±9.86	7.2%	29.77±16.37	23.57±10.88	20.8%
MDA	185.89±15.52	940±20.52	393±30.12	59%	2457±22.06	544±34.24	77.3%
FRAP	0.224±0.30	0.112±0.13	0.148±0.28	31.9%	0.082±0.16	0.091±0.11	12.3%
GSH	0.727±.34	0.169 ±0.23	0.232±0.14	43.1%	0.108±0.16	0.191±0.20	75%

Relationship between loss of function mutation and clinical presentation with recurrent ACS including ST was analyzed.
Results: Out of 110 patients, 26 (23.64%) had normal genotype, 52(47.23%) loss of function mutation *2 and 39 (35.45%) gain of function mutation *17, 7 (6.36%) patients were undefined metabolizers (*2/*17) which were excluded from analyses. Final analyses included 103 patients, with 45 (40.90%) having loss of function. Overall 51 patients had ACS, with 27 developing recurrence while on clopidogrel. The prevalence of loss of function mutation was no different between the group with recurrences and those without recurrences (55.6% vs. 50%, p=0.7). Two patients developed ST while on clopidogrel; both had loss of function mutation.
Conclusion: CYP2C19 gene polymorphisms are common in Indian population. Loss of function mutation status did not affect the clinical outcomes. A larger study also considering P2Y12 receptor polymorphisms together with platelet activity testing, may be required to establish the role of CYP2C19 gene polymorphisms in clinical practice.

Prevalence and severity of asymptomatic coronary artery disease and carotid artery disease in patients with peripheral vascular disease

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Objectives: Peripheral vascular disease patients are at high risk of developing cardiovascular and cerebrovascular events. The purpose of this study was to evaluate the prevalence and severity of Coronary artery disease and Carotid artery disease in patients with Peripheral vascular disease
Methods: We studied 56 (45 males and 11 females) patients with peripheral vascular disease of lower limbs admitted in our institution between August 2012 to April 2013. These patients did not have symptoms of angina or dyspnea. Coronary angiography and carotid Doppler study was done in all patients during their hospital stay.
Results: 25 of 56 patients (44.7%) had significant CAD, 6 patients (10.7%) had significant carotid artery lesion and 14 patients (25%) had both. In patients with significant CAD 13 patients (52%) had severe CAD (left main or tripple vessel or proximal LAD lesion). 2 patients (8%) had left main, 7 patients (28%) had triple vessel disease and 4 patients (16%) had proximal LAD lesion corresponding to 33.3% of total cohort. Among the 14 patients with both lesion, 9 (64%) had severe CAD of which 1 patient (9%) had left main, 5 patients (35%) had tripple vessel disease and 3 patients (21%) had proximal LAD lesion. The percent of patients with severe CAD (left main, 3 vessel or proximal left anterior descending lesion) among those with Carotid artery disease was higher (64%) compared to those without Carotid artery disease (52%).
Conclusions: Severe and asymptomatic Coronary artery disease and Carotid artery disease are quite prevalent in patients with Peripheral vascular disease.. Cost-effective strategies to detect asymptomatic Coronary artery disease and Carotid artery disease in patients with peripheral vascular disease need to be investigated in large multicenter studies.

Comparison of fractional flow reserve and stress myocardial perfusion imaging in assessing the functional significance of coronary stenoses in patients undergoing coronary angiography

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Background: Several studies have been reported about the usefulness of Fractional Flow Reserve (FFR) to assess the functional significance of moderately severe coronary stenosis. However there is no published study available from India.
Aims and objective: The purpose of this study was to compare FFR with stress myocardial perfusion imaging in moderately severe coronary stenosis and to determine the role of FFR in decision making of coronary revascularization in Indian patients undergoing coronary angiography.
Methods: Patients of both sex, above the age of 18 years and who had moderately severe coronary stenosis (50-70%) on quantitative coronary angiography (QCA) were included in this study. FFR was measured, using 0.014 inch sensor tipped high fidelity pressure wire (Radi Medical Systems Inc, Uppsala Sweden), at baseline and during maximal hyperemia produced by intravenous adenosine. FFR value >0.8 was considered negative (non ischemic group) and FFR ≤ 0.8 was taken as positive (ischemic group). Stress ^{99m}Tc-tetrofosmin scintigraphy was performed within 24 hours of FFR measurement using intravenous adenosine as per standard stress/rest protocol. Images were taken by standard gamma camera.
Results: Total 50 patients were enrolled. The mean age was 56.84 years, ranging from 37 - 75 years. 33 (66%) were males and 17 (34%) were females. 25 (50%) patients were hypertensive, 17 (34%) were diabetics and 23 (46%) were having dyslipidemia. 28 (56%) patients presented with acute coronary syndrome (ACS) and 22 (44%) patients with chronic stable angina. Left anterior descending artery (LAD) was the most common vessel involved in 20 (40%) patients followed by Right Coronary Artery (RCA) in 18 (36%) patients and Left Circumflex (LCx) in 12 (24%) patients. FFR was positive in 25 (50%) patients, stress imaging was positive in 27 (54%) patients while negative in 23 (46%) patients. The sensitivity of FFR as compared to stress imaging was 92.6%, specificity was 100%, positive predictive value was 100% and negative predictive value was 92%. Though there was a great overlap, the mean percent diameter stenosis was significantly more severe in FFR positive ischemic group than non ischemic group (67.12 ± 3.06 Vs 60.48 ± 5.54) ($p<0.001$). Percutanious coronary intervention (PCI) was advised in all FFR positive group. Out of 27 stress imaging positive patients, PCI was performed in 23 (85.2%) patients, while 2 (7.4%) were negative on FFR and PCI was not advised. We have avoided Percutanious coronary intervention in two patients (14.8%), where stress imaging was positive while FFR was negative. No significant effect was found on FFR and stress imaging with mode of presentation, age, gender and important risk factors for coronary artery disease. Our data were consistent with other study reported.
Conclusion: With this small, nonrandomized study, we conclude that FFR is a useful index to assess the functional significance of moderately severe lesions on angiography and is also helpful in decision making regarding coronary revascularization strategy in Indian patients.

Prevalence of metabolic syndrome and factors predicting metabolic syndrome in CAD patients in a tertiary care center

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Background: Metabolic syndrome (MS) is a constellation of metabolic factors cluster for cardiovascular disease and diabetes mellitus. MS has not been studied in detail in north Indian CAD patients.
Aims and objectives of the study: We undertook this study to see the prevalence of MS and factors predicting MS in CAD patients.
Methods: Two hundred and thirty five consecutive CAD undergoing coronary angioplasty at our institute was included in the study. MS was diagnosed as per modified ATP III criteria (at least 3/5 features).
Results: MS was present in 181/235 (77%) of patients (mean age 56.6 ± 9.6, 193 male, 99 diabetics). Patients with MS were significantly older (57.4±8.6 vs 53.9±10.2 years=0.012), had higher SBP (131.8±12.5 vs 125.4±8.4, P<0.001), DBP (82.8 ±7.1 vs 80.0 ±7.8, P=0.015), serum triglycerides (148.1±62.5 vs 105.2±29.9,p<0.001), total cholesterol (140.4 ±39.8 vs 124.3±34.8, p<0.001), LDL cholesterol (80.0±31.6 vs 70.5±14.9, p=0.010) but significantly lower GFR (64.3±14.1 vs 70.1±14.9,p=0.010) compared to patients without MS. They were also having significantly high BMI (26.7±4.1 vs 24.6±5.3, P=0.002), Mid Upper Arm Circumference (28.7±3.0 vs 27.5±3.5, p=0.011), waist circumference (97.9 ± 8.2 vs 90.3±10.2, p<0.001), waist hip ratio (WHR) (1.02 ± 0.05 vs 0.99± 0.6), waist height ratio (0.61±0.07 vs 0.55± 0.05, p<0.001) and conicity index (1.4± 0.07 vs 1.33± 1.09, p=0.001) compared to patients without MS. Patients with and without MS had a statistically similar intake of energy (2266.4±385.4 vs 2360.8±451.4, p=0.131),fat (86.6±20.3 vs 87.9±27.5, p=0.334), SFA(27.0±8.8 vs 29.0±8.9, p=0.147), MUFA(26.8±7.9 vs 26.9±7.9, p=0.936), PUFA(32.5±9.4 vs 32.7±13.0, p=0.861),total dietary fiber(18.5±4.4 vs 17.4±3.7, p=0.095),insoluble dietary fiber (13.8±3.4 vs 13.2±2.8,p=0.213), soluble dietary fiber (3.7±1.0vs 3.5±0.9,p=0.175) and vitamin B_{12}(1.2±1.8 vs 1.1±0.7, p=0.676).On univariate regression analysis age [OR 1.04 (95% CI 1.01-1.08, p=0.013)], BMI [OR 2.7 (95% CI 1.4-5.3), p=0.004], GFR [OR 2.4(95% CI 1.2-4.8), p=0.017], waist height ratio [OR 6.6 (95% CI 1.9-23.5), p=0.004],and conicity index [OR 635.1(95% CI 11.1-366.0), p=002] while on multivariate regression analysis only GFR [OR 2.4(95% CI 1.1-5.3), p=0.029], BMI [OR 2.7(95% CI 1.2-6.2), p=0.017] and conicity index [OR 182.2(95% 2.2-150.7), p=0.021] were found to be the independent factors predicting MS.
Conclusion: Metabolic Syndrome was highly prevalent (77%) in our patient population. Patients with MS were significantly older, had significantly higher lipid values, higher BMI, WHR, waist height ratio and conicity index but lower GFR. Dietary intake was statistically similar in both the groups. BMI (>23), GFR (<60) and conicity index were the significant factors predicting MS.

Risk stratification after STEMI with fragmented QRS – A simple EKG marker

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Fragmented QRS complexes (fQRSs), which include various RSR' patterns, without a typical bundle-branch block are markers of altered ventricular depolarization owing to a prior myocardial scar. Presence of fQRS might be associated with a poorer outcome in patients of acute STEMI. 214 consecutive patients of acute ST Elevation Myocardial Infarction (STEMI) were studied to delineate impact of fQRS on outcome after AMI. Fragmented QRS developed in 139 patients out of 214 (64.9% = GROUP A) during the hospital stay. 75 patients did not develop fragmented QRS during the hospital stay (35.04% = GROUP B). In comparison Q wave which appeared in 137 patients (64.01%), 77 (35.9%) patients who did not develop a Q wave on ECG post MI, fragmented QRS developed in 57 of them (26.6%), thus making it a valuable tool in identifying a Q wave MI. Fragmentation of QRS developed within first 48 hours of STEMI in 97% patients and was most commonly seen in inferior leads (76.2%). Demographic data was comparable in two groups. Cardiac markers CK MB and Troponin-I levels were significantly higher in group A patients (p<0.01) indicating increased magnitude of myocardial necrosis associated with fragmentation QRS. Increased rates of post MI angina, congestive heart failure, and major tachyarrhythmias were observed upto 30 days of follow up in patients of group A as compared to group B patients (p<0.01). This study of 214 STEMI patients highlighted the usefulness of fragmented QRS in identifying patients at higher risk of MAACE with larger cumulated areas of ischemic jeopardized or necrotic myocardium, and it can provide very useful information in the risk stratification of such patients. It also helps to identify the evidence of infarction in patients without a Q wave on surface ECG.

Improvement in exercise capacity is independent of ejection fraction in patients with coronary artery disease (CAD)

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Aims and objective: A low ejection fraction (EF<35%) is considered high risk for cardiac events. It is believed that these patients should not undertake intense physical activity. The present study was aimed to determine safety and efficacy of exercise training in CAD with low EF and to evaluate whether outcomes differ in patients with normal or reduced EF.
Methods: 125 patient with CHD were prospectively analyzed, based on the EF after coronary event patients were divided in to three groups: normal EF (55%- 77%-70patients), moderately reduced EF (35%-54%: 30 patients) and low EF (<35%: 25 patients). Exercise capacity was determined based on history of physical activity undertaken. Exercise was prescribed at 60% -80% of predicted maximum heart rate.
Results: Physical activity significantly improved exercise endurance. On comparing the % change in the distance covered and exercise level and activities undertaken no significant difference (p=0.694) was found between the 3 groups, indicating that improvement in the exercise capacity is independent of the EF.
Conclusion: Low EF patients with CHD can safely participate in symptom monitored and medically supervised physical activity, and experience significant gains in exercise capacity equivalent to those with normal EF monitored by symptoms arrthymias and EF.
Keywords: Exercise capacity, Ejection fraction.

Differential release kinetics of cardiac biomarkers in patients undergoing off pump coronary artery bypass surgery

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Background: B-type natriuretic peptide (BNP) is a routinely used biomarker for heart failure. Levels of BNP increase in patients undergoing open heart surgery. Advent of off pump CABG (OPCABG) has reduced peri-operative morbidity and mortality.
Methods: We prospectively studied release kinetics of BNP, Troponin-I (TnI) and CKMB 24 hours prior, and 6,24,48 hours and 1 month after OPCABG in 80 patients. (mean age 59.1 yrs, LVEF 52.4%,83% males).
Results: Baseline BNP, TnI and CKMB levels were 105.8 pg/ml, 0.9 ng/ml and 2.34 ng/ml. Although all biomarkers increased significantly within 6 hours of surgery, release kinetics were different. While peak BNP levels occurred in 96% patients by 24-48 hours, for TnI and CKMB, this was observed in only two-thirds. A trend towards fall in all biomarkers was seen by 48 hours; while TnI and CKMB levels normalized in all at 1 month, 42% patients still had BNP $>$ 100 pg/ml. Those with baseline BNP $>$ 100 pg/ml had lower LVEF (43.6vs55.6%, $p<0.01$), longer inotrope duration (43.8vs31.4 hrs, $p=0.03$) and ventilator support time (33.9vs25.6 hrs, $p=0.04$); mean ICU and hospital stay were similar to those with lower BNP. Despite baseline BNP differences, levels of TnI and CKMB at all times were similar in these two groups. BNP levels had positive correlation with patient age and angiographic Syntax score ($p=0.02$) and negative correlation with LVEF. Of all biomarkers, only baseline BNP predicted inotrope duration (OR4.9, 95%CI:1.3-17.7, $p=.01$) and ventilation time (OR4.5,95%CI:1.2-16.6, $p=.02$). Post-operative levels of BNP at 6,24 and 48 hours and delta BNP were significant predictors of mean ventilation time only.
Conclusion: Even in patients undergoing OPCABG, there is significant natriuretic peptide (BNP) and myocardial enzyme release (TnI, CKMB) notable within 6 hours of surgery. Patients with higher baseline BNP levels had longer inotrope and ventilator duration. Of all the biomarkers, only BNP had an association with post-operative variables.

Aspirin and clopidogrel resistance and their genetic association in Indian patients with coronary artery disease

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Introduction: Combination therapy with clopidogrel and low dose aspirin is the current standard of care in the management of patients with Coronary Artery Disease (CAD) including acute coronary syndromes (ACS). Between 4-30% of patients treated with conventional doses of clopidogrel show an inadequate platelet response. This may partly be done to underlying genetic diversity among individuals. Platelet resistance to aspirin is reported to affect $<1\%$ of patients as tested by light transmission aggregometry (LTA). To the best of our knowledge, no studies are available in the Indian population of genetic polymorphisms which may affect platelet response by these antiplatelet agents.
Methods: A total of 65 patients with CAD/ACS who were stable on dual anti platelet therapy (Clopidogrel 75 mg OD and aspirin 150 mg OD), were investigated along with age and sex matched 65 controls. Demographic and clinical data was collected on a predesigned clinical proforma. Platelet function testing by light transmission aggregometry was done with 4 agonists (ADP 2μM and 10μM, Epinephrine 5μM, Collagen 2μg/ml, Arachidonic Acid 0.75mM) in each patient/control. After meta analysis the criteria employed for the Aspirin resistance was mean platelet aggregation $\geq$70% with 10μM ADP and $\geq$20% with 0.75mM of Arachidonic acid. Aspirin semi responders were defined as those meeting only one of the above criteria. Clopidogrel resistance was defined as $<$10% decrease from the baseline in platelet aggregation in response to ADP 2 & 10μM.Semi responders were defined as 10-29% ($<$30%) decrease from the baseline. A baseline mean platelet aggregation obtained from 28 controls. Polymorphisms CYP2C19*2, CYP2C*3, CYP3A5*3 and PLA1/A2 were genotyped by PCR-RFLP.
Results: ADP induced aggregation was highly variable among patients. While clopidogrel resistance was observed in 1(1.5%) patient, 27(41.5%) patients were semi responders to clopidogrel. 4(6.15%) patients were semi responders but none were resistant to aspirin. All 4(6.15%) were semi responders to clopidogrel also. Poor responders had higher frequency of the *2 Allele of CYP2C19 ($p=0.026$) & *3 Allele of CYP3A5 ($p=0.022$) as compared to responders. PLA1 was also found to be significantly higher in platelet hypo responders ($p=0.045$). None of the patients were found to have mutant genotype of CYP2C19*3. Statistically significant correlation was not found in responders and semi & non responders in relation to angina class, diabetes, hypertension, type of intervention including drug eluting stents, different statins and PPI.
Conclusion: There was significantly higher frequency of *2 allele of CYP2C19, *3 allele of CYP3A5 and PLA1 in clopidogrel semi responders as compared to responders. But no clinical parameter, type of intervention and drugs affected response to aspirin and clopidogrel. These preliminary findings suggest that polymorphisms may be associated with inadequate response to antiplatelet drugs.

Prevalence of coronary atherosclerosis – An autopsy study in a tertiary care centre in South India

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Background: Coronary atherosclerosis is the leading cause of morbidity and mortality in the industrial world. However, data on the actual population burden of atherosclerosis is lacking. Autopsy studies may be an effective method of identifying population trends in coronary atherosclerosis.
Aims and objectives: To study the autopsy prevalence of significant coronary atherosclerosis in an unselected group of medicolegal autopsies.
Methods: Cross sectional study conducted on 300 consecutive autopsies conducted in our institution from February 2013 to April 2013. The heart specimens were weighed and gross morphology

studied. Serial sections (3mm apart) of coronary arteries were examined for gross atherosclerosis. In the first 100 specimens, macroscopic atherosclerotic lesions were biopsied and graded by histopathology and in the absence of any specific macroscopic lesions, sections from each of the coronary artery segments were examined.

Results: The mean age group was 46.28 ± 18 yrs and females accounted for 22%(68/300) of the population studied. Sudden cardiac death as the event leading to death was identified in 6.3% (19/300) of the study population. Female gender was associated with a significantly lower mean weight of the gross specimen and significantly lower ostial diameter of coronary arteries. RVEMF was identified in 1% (3/300) indicating higher prevalence of the disease in this part of the country.

By visual assessment, significant atherosclerotic luminal stenosis (defined as ≥50% area stenosis in Left Main coronary artery (LMCA) & ≥75% area stenosis in other vessels) was identified in 68 (22.6%) of cases. Out of these, isolated significant LMCA disease was found in 7 (2.3%) of cases, LMCA + single vessel disease (SVD) was found in 5 (1.7%) cases, LMCA+ two vessel disease (2VD) was found in 4 (1.3%) of the cases and LMCA+three vessel disease (3VD) was found in 1(0.3%) case, SVD in 37 (12.3%) cases and 2VD in 14 (4.7%) cases.

Histopathology revealed significant atheroma (≥ Grade 4) in 61% of cases, of which, isolated significant LMCA disease was found in 3%, LMCA+ SVD- 8% cases, LMCA + 2VD - 9% of the cases, LMCA+3VD- 4% of the cases, SVD- 14% cases, 2VD in 16% cases and 3VD in 7% of cases.

Visual assessment of coronary arteries was 85% sensitive and 91.25% specific for identification of significant atherosclerosis as compared to histopathology, which is the gold standard. However, histopathological assessment of the aorta resulted in the pick up of 20 more cases of significant grade of atherosclerosis(≥ grade4) which would have been regarded as insignificant by visual assessment—a 20% higher pick up rate.

Conclusions: Although the cardiac cause of death could be identified only in 6.3% cases, significant coronary atherosclerosis was identified in 22% of gross specimens and 61% of histopathology specimens, highlighting the high prevalence of significant, asymptomatic coronary atherosclerotic disease in the population. Though visual assessment had good sensitivity and specificity in detection of significant coronary atherosclerosis, histopathology had an edge in case of aortic atherosclerosis.

Adiponectin, central obesity, carotid intima media thickness and coronary artery disease

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Background: Atherosclerosis related coronary artery disease has emerged as a principal cause of death all over the world. One of the clinical syndromes which often lead to coronary artery disease (CAD) is metabolic syndrome. Adiponectin is diminished both in metabolic syndrome and CAD. Carotid intima media thickness (CIMT), a surrogate marker of subclinical atherosclerosis has been found to be increased in CAD and has inverse relationship with adiponectin. In view of the paucity of Indian studies available addressing the interrelationship between adiponectin, waist circumference, CAD and CIMT; we aimed to examine the interrelationship between adiponectin, central obesity and CIMT in patients suffering from CAD.

Methods: We studied the levels of adiponectin, measured CIMT and obesity profile of CAD patients (n=50) ≤60yrs admitted in CCU of GTB Hospital and compared it with apparently healthy controls (n=50). Increased waist circumference, considered as central obesity was defined as WC ≥90 cm in males, ≥80 cm in females and obesity was considered as Body Mass Index ≥25 kg/m^2.

Results: The mean age in CAD cases (43.7±8.2yrs) and controls (43.6±9.2yrs) were similar. Smoking was found in 36 (72%) of CAD cases and 23 (46%) of control subjects. Increased waist circumference was found in 24 (48%) of CAD cases and 12 (24%) of control subjects. Raised BMI was found in 42% cases as compared to 22% in healthy controls. Mean adiponectin levels in CAD patients was 8.14±3.86 μg/ml as compared to 9.4±3.9 μg/ml in healthy controls. Values though higher in CAD group was statistically insignificant. Mean CIMT was higher in CAD cases as compared to healthy controls (0.68±0.10 mm vs 0.60±0.11mm). The mean adiponectin levels were higher in non-obese as compared to obese individuals (9.2 vs 6.9 μg/ml) and those without central obesity as compared to those with central obesity (9.3 vs 7.2 μg/ml) in CAD patients. Adiponectin had a negative correlation with CIMT in CAD patients [Pearson's correlation = -0.198 (p=0.220)].

Conclusion: Our findings indicate evidence of low adiponectin, increased CIMT and increased prevalence of central obesity in CAD patients as compared to healthy controls.

Correlation between plasma 25-OH-D level with angiographic finding in male STEMI patient

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Background: Growing evidence has suggested that low blood levels of 25-OH vitamin D are associated with higher risk of developing coronary heart disease. Because hypovitaminosis D is prevalent and easily correctable, establishing the relationship between vit D and risk of MI is important.

Aims and objective: To evaluate serum 25-OH −D level in male patient with STEMI and to correlate with severity of angiographic findings.

Method: A nested case-control study was conducted in the department of Cardiology SCB MCH taking 120 Male STEMI patient aged 40 to 75 years. Blood sample collected after admission and correlated with severity of Angiographic finding.

Result: After adjustment for matched variables, mean serum 25-OH D level was 32.47 ± 4.35 ng/ml in control vs 14.034 ± 5.39 ng/ml in study group (p value < 0.0001). Among 83 patients 21.7% having SVD (Single vessel disease) with mean 25-OH-D level was 21.62 ± 2.34 ng/ml, 36.1% having DVD (double vessel disease) with mean level was 14.6 ± 2.10 ng/ml; 42.2% having TVD with mean 25-OH-D level found 9.66 ± 3.60 ng/ml. Lower level of 25-OH-D leads to increased severity of angiographic findings. Findings are more specific in older patients. Patients with lower vitamin d level having more trend towards complications like heart failure, arrhythmia, periprocedural AMI etc.

Conclusion: This study analysis regarding the level of vit D and its correlation with severity in angiogram in male patient with STEMI. Low levels of 25-OH-D might be one of the etiological factor and prognostic marker associated with higher risk of myocardial infarction in a graded manner, even after controlling for factors known to be associated with coronary artery disease.

Identification of infection related biomarkers beta-defensin and histatin-3 for risk assessment for recurrent coronary artery disease

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Background: It is well understood that premature coronary artery disease (CAD) occurs more frequently in Indian population in comparison to other ethnic groups. Several studies including our recent findings have suggested that pathogen burden specifically Cytomegalovirus (CMV) infection in combination with inflammatory markers show significant association with CAD and recurrent CAD in Indians. Further global proteome analysis may give more biomarkers for better risk assessment for these events.
Objectives: This study was aimed at identifying new biomarkers by performing comparative global proteome analysis for improvement of risk assessment of recurrent CAD.
Methods: 170 age and gender matched subjects (85 CAD affected and 85 recurrent CAD) were selected for this study from ongoing Indian Atherosclerosis Research Study (IARS) as published earlier. All the blood samples were collected after overnight fasting of 12-14 hours and stored at -80°C. Global proteomic analysis was performed using Surface Enhanced Laser Desorption/Ionization CM10 arrays on serum samples of these subjects and Tagident software for protein identification which were validated using western blot followed by ELISA assays. Logistic regression, hazards ratio, C-statistics, Keplan Meier curve analysis, multi-marker risk score and net reclassification index were performed using SPSS Version 17 software and R-package.
Results: We have identified 39 protein peaks differentially expressed of which 19 were significantly differentially expressed in CAD affected versus recurrent subjects. Of these 19 peaks, two peaks corresponding to m/z 8588 and 1864 identified as beta-defensin-128 and histatin-3 were significantly associated with recurrent CAD with odds ratios of 7.49 (95%CI 2.57-21.90, p-value <0.001) and 1.4 (95%CI 1.02-2.13, p-value=0.042) respectively. Further analysis shows higher levels of these biomarkers in serum of recurrent event subjects compared to affected subjects. Use of these biomarkers in the risk assessment was evaluated by hazards ratio analysis where combination of biomarkers with conventional risk factors had a hazards ratio of 1.833 (95%CI 1.34-2.50, p-value=1.30x10-4) which served as the final model for risk assessment. Multi-marker risk score of the combined model
Conclusions: We have identified two potential biomarkers for risk assessment for recurrent CAD namely beta-defensin-128 and histatin-3. Further validation of these biomarkers in larger cohort may help in improvement of risk stratification for recurrent CAD subjects.

Global urinary proteome analysis for biomarker discovery for coronary artery disease risk prediction in Asian Indians

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Background: Diagnosis of premature coronary artery disease (CAD) is a major concern and several studies have focused on using the urinary proteome approach due to non-invasive biofluid collection, low complexity and stability of proteins. These studies are more important in Indian population where premature CAD is increasing at alarming rate.
Aim: In this study we have analyzed global proteomic profile analysis of urinary proteome of Asian Indians to identify biomarker profile for premature CAD risk prediction.
Methods: 407 age and gender matched subjects were selected for a case control study from ongoing Indian Atherosclerosis Research Study (IARS) (Indian Heart J, 2010;6:286-95) which was designed according to the guidelines of World Medical Association Declaration of Helsinki and Indian Council of Medical Research and approved by Institutional Ethics Committee. Patients living in India for at least two generations were enrolled after signed informed consent was obtained (male≤60 years and female≤63 years at onset of disease, diagnosed as CAD without any major diseases like cancer or liver failure). All the urine samples were collected after overnight fasting of 12-14 hours and stored at -80oC. Global proteomic analysis of urine samples were performed using Surface Enhanced Laser Desorption/Ionization-Time of Flight (SELDI-TOF) on three different arrays cationic CM10 (204 CAD affected and 203 unaffected), anionic Q10 (80 CAD affected and 79 unaffected) and metal binding IMAC30 (196 CAD affected and 195 unaffected) chips. For risk prediction model development, we used four different statistical methods namely Support Vector Machine (SVM), Multilayer perception Artificial Neural Network (ANN), Discrimination Analysis (DA) and Logistic Regression (LR).
Results: 118 significantly differently expressed protein profiles were identified from SELDI-TOF analysis in all the arrays. The CM10 array gave 55 peaks, 29 peaks in Q10 and 34 in IMAC array chips. Four different statistical analyses (SVM, ANN, DA and LR) were performed for developing risk assessment algorithm for each array type. In each of the statistical methods half of the samples were used for validation in a blind test. In all the array types, SVM based algorithm gave the significant risk assessment. In CM10 array the SVM based risk stratification had sensitivity of 91.22%, specificity of 67.13%, AUC of 0.961, Q10 array sensitivity of 82.93%, specificity of 79.22%, AUC of 0.921 and IMAC: sensitivity of 78.76%, specificity of 80.30%, AUC of 0.878. Furthermore, we identified that five protein peaks corresponding to myotropin, prepronociceptin, StAR-related lipid transfer protein 5, D-amino acid oxidase activator, and integral membrane protein 2C as significant proteins in the above SVM based model for risk assessment.
Conclusions: Our data suggests that urinary proteome profile can be used to identify new biomarkers which may be related to premature CAD in Asian Indians. Further studies of integrating the genomic data (gene expression and single nucleotide polymorphism) using bioinformatics tools are underway for developing systems biology based risk assessment.

Protein-protein interaction network topology based multimarker identification for coronary artery disease

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Background: Cardiovascular disease is a complex disease resulting from combinatorial affect of environmental, genetic and life style factors. Multimarker based risk prediction methods are

being proposed in order to identify the high risk population and provide required clinical interventions to prevent the disease from occurring. Many methods depend only on statistical significance of based association of biomarkers to the disease and less of biological functions or networks of the proteins playing important role in the disease. Herein, we explored protein-protein interaction (PPI) network topology based identification of core biomarkers which might of use for multimarker risk prediction for coronary artery disease.

Methods: We downloaded all the genes listed in the CAD GENE database version 1 and constructed protein-protein interaction network using STRING database which was further analyzed in Cytoscape (version 2.8.3) followed by functional enrichment using Cluepedia. 500 patient serum samples were used to validate selected biomarkers from Indian Atherosclerosis study. SPSS version 17 software was used to perform the statistical analysis.

Results: Using the two centrality measures, node degree distribution and betweenness centrality for all 318 seed proteins IL6 was observed as the hub protein following power of law distribution with an r2 value of 0.614. Out of all the nodes of the PPI network 15 proteins were found as backbone proteins which after extending the network give 346 proteins consisting of all the proteins included in the network. The functional enrichment using significant Gene Ontology terms (p-value <0.01 after Benjamini-Hochberg correction) gave a 30 important GO terms. Further, we validated 2 biomarkers IL6 and hsCRP to be associated with CAD.

Conclusion: The network of biomarkers from 318 CAD gene database have yielded a important lead of backbone biomarkers from different pathways correlating to risk of CAD.

Integration of genomic and proteomic approaches to understand the transcriptional regulatory program in coronary artery disease

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Background: Patients with coronary artery disease (CAD) show a panel of differentially regulated serum biomarkers indicative of modulation of several pathways from disease onset to progression. Some of these biomarkers have been proposed for multimarker risk prediction methods. The underlying mechanism of the expression changes and modulation of the pathways in risk assessment needs to be addressed.

Aim: Our present work focuses on understanding the regulatory mechanisms at transcriptional level by identifying the core and specific transcription factors that regulate the CAD associated pathways.

Methods: Using the principles of systems biology we integrated the genomics (gene expression data of 10 CAD affected and 10 unaffected) and proteomics (400 affected and 400 unaffected) data with computational tools. The two sets of samples for gene expression and proteome analysis were selected from ongoing Indian Atherosclerosis Research Study (IARS) (Indian Heart J, 2010;6:286-95) which was designed according to the guidelines of World Medical Association Declaration of Helsinki and Indian Council of Medical Research and approved by Institutional Ethics Committee. Patients living in India for at least two generations were enrolled after signed informed consent was obtained (male$\leq$60 years and female$\leq$63 years at onset of disease, diagnosed as CAD) and all the blood samples were collected after overnight fasting of 12-14 hours and stored at -80oC. We selected biomarkers from 7 different pathways based on their association with the disease and assayed 30 biomarkers by ELISA and built network modules using STRING database. The biomarkers selected were inflammation: Interleukin-6, Interleukin-8, Interleukin-10, Interleukin-12A, Interleukin-12B, Interleukin-18, Monocyte chemoattractant protein-1, High sensitive C reactive protein, Interferon gamma, Matrix metalloprotease-9 and secretary Phospholipase A2 and Gamma-glutamyltransferase-5, coagulation: Factor VII, Fibrinogen, Prothrombin, Plasminogen activator inhibitor-1, Plasminogen, Tissue factor, von Willebrand Factor, Platelet derived growth factor, cell adhesion: Clusterin and P-selectin, obesity: Adiponectin and Leptin, oxidative stress: Myeloperoxidase, stress: HSP27, HSP60, HSP70 and renal function: Cystatin C. The promoter sequence analysis for transcription factor binding sites was performed using Genomatrix software and microarray data was analyzed using R package v2.14.2.

Results: The Genomatrix software predicted 443 transcription factors binding profile in 30 different biomarkers, however, in global mRNA expression only 34 transcription factors were found to be differentially expressed in CAD affected and unaffected subjects. Out of these 5 transcription factors binding sites were highly represented in the promoter sequences of all 30 biomarkers thus forming the core regulatory transcription machinery which might influence the differential levels of biomarkers in serum of CAD affected subjects in comparison to unaffected. The 5 core transcription factors were PPARG, EGR1, ETV1, KLF7 and ESRRA and their combinatorial regulation may influence all the 7 important pathways associated with CAD as outlined above.

Conclusions: Our analysis suggests that a profile of 5 core transcription factors binding to the promoters may play a major role in differential levels of biomarkers associated with CAD and thus use of this profile of transcription factors may be useful to identify new biomarkers which may play a role in risk assessment in CAD.

Association between the Glu298Asp polymorphism of endothelial nitric oxide synthase and coronary slow flow in the North Indian population

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Background: Genetic variants in endothelial nitric oxide synthase (*NOS3* gene) leading to endothelial dysfunction may be predisposing to coronary slow flow phenomenon (CSFP).

Objective: To study the role of *NOS3* Glu298Asp polymorphism and NO levels in a subset of North Indian patients with coronary slow flow phenomenon

Methods and results: In this study, we examined the relationship between Glu298Asp (894G/T) polymorphism of *NOS3* and CSFP. A total of 27 patients with CSFP but otherwise normal coronary arteries (mean age 50.4$\pm$8.2 years) and 200 controls with normal coronary angiogram (mean age 50.3$\pm$9.3 years) were screened for Glu298Asp polymorphism by restriction fragment length polymorphism. Nitric oxide levels were determined by Griess' enzymatic method for an association with the polymorphisms. The genotype distribution of the Glu298Asp polymorphism differed significantly between the CSFP patients and controls ($P<0.05$). The

dominant genetic model revealed that GT+TT was significantly prevalent in patients in comparison to controls (P=0.001) and T allele was significantly prevalent in patients (P=0.001). Nitric oxide level was higher in patients than in controls, the values being 144.75±50.84 μM and 131.00±59.6 μM, respectively (P=0.055). The genotypes showed a trend of association with NO levels, which decreased linearly in the order of GG>GT>TT (P >0.05).

Conclusions: The Glu298Asp polymorphism of *NOS3* may be a responsible for CSFP.

Interventional Cardiology

Rare cause of cyanosis-abernathy malformation and park malformation

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We present a 9 year old girl who presented to our outpatient department with cyanosis and clubbing with dyspnoea NYHA class II of 8 months duration. Patient had Ostium secundum ASD for which she underwent surgical closure 3 years back. Clinical examination was unremarkable except for cyanosis and clubbing. Her resting oxygen saturation was 84%. ECHO revealed normal pulmonary venous drainage, intact IAS and normal biventricular function and pulmonary arterial pressure. Contrast ECHO with agitated saline revealed the appearance of dense contrast in the left atrium and ventricle after 3 to 4 cycles after appearing in right ventricle which is diagnostic of pulmonary A-V communication with 100% specificity. The gold standard 320 sliced CT angio done elsewhere was reported normal.

With ECHO finding which was very characteristic of pulmonary A-V communication we proceeded with pulmonary angiogram which was suggestive of bilateral diffuse pulmonary A-V communication. The USG abdomen was normal except for a small hyperechoeic lesion in the spleen suggestive of hemangioma. The clinical profile at this juncture was suggestive of osler-rendu-weber disease where diffuse pulmonary A-V malformation is a part of the disease along with hemangiomas in other parts of the body. Hence it was decided to screen other areas of the body especially the brain to identify and treat any A-V malformation in the brain so that a major catastrophe can be prevented.

Repeat USG done was suggestive of Phelebolith in the Spleen rather than Hemangioma. MRI Brain was done showed changes that are usually seen in hepatic failure. Normally, ammonia and other vasodilators from portal circulation gets detoxified in the liver before reaching systemic circulation. In hepatic failure this step is bypassed hence reaches various parts of the body producing some typical pathological changes. But with normal liver function in this child why should these changes occur?

These findings arouse the suspicion of a communication reaching systemic circulation bypassing liver. Repeat ultrasound abdomen revealed large left branch of portal vein reaching IVC-RA junction bypassing liver. This could also explain diffuse pulmonary A-V communication producing cyanosis.64 slice CT whole abdomen was done which revealed a Large posterior division of the left portal vein draining into the IVC −Atrial junction (Abernathy Type II) with a small tortuous venous channel from branch of the left portal vein draining into left hepatic vein (Park Type II). Inferior Vena cava and selective angiogram of the communicating portal vein done, confirmed the CT findings.

Embolization of the Abernathy malformation was done using amplatzer vascular plug-II and coil embolization of the park malformation done.

Follow up after 3 weeks revealed complete absence of cyanosis, resting saturation of 97% and normal contrast ECHO.

This is one of the rarest cause of cyanosis.

This case is unique for the following reasons.

Gold standard 320 sliced CT was not able to identify the diffuse pulmonary A-V communication though contrast ECHO was characteristic.

Both Abernathy and park malformation in the same patient.

Co-existed with ASD but presented late after ASD closure.

Symptomatic relief after embolization.

With all above unique features this is the first of its kind to be reported in the literature.

5 years clinical follow up results of Genous™ bioengineered stent in acute coronary syndrome in Indian patients

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Background: Endothelial progenitor cell capturing stents (EPCS) are coated with CD4 antibodies targeting endothelial progenitor cells and thus help in early healing & likely to prevent early and late stent thrombosis. Impact of EPCS in the real world scenario on the prevention of late stent thrombosis is not known. We assessed the long term (>5 years) clinical outcome of EPCS implanted for the treatment of acute coronary syndrome (ACS) in our cohort.

Methods: 22 unselected patients admitted with ACS between May 2006 and March 2007 with ACS were treated with 24 EPCS. All patients received dual antiplatelet therapy upto 1 year followed by Aspirin indefinitely. All patients also received Atorvastatin 80 mg following the procedure and continued as per standard protocol. All these patients were followed up upto more than 5 years & long term thereafter.

Results: 22 patients were treated with 24 stents. Out of 11 ST elevation MI (STEMI) one patient received 2 overlapping stents. Rest of the patients had Non STEMI/ACS. Of these, one patient had received 2 non study overlapping bare metal stent along with 2 EPCS in the RCA because of long dissection. One patient had plaque prolapse during the procedure. One patient with cardiogenic shock (CS) died after 12 hours. Angiographic follow up at 8 months done on 10 STEMI patients showed reference vessel diameter mean/SD 2.94+0.29 post procedure, 2.64+0.57 at 8 months, post procedure MLD 2.52+0.35mm & 1.53 + 1.01 at 8 months, post procedure diameter stenosis 11.7 + 5.59% & 45.2+30.2% at 8 months, binary stenosis in 5(50%), late loss of 0.97+0.94 mm and late loss index of 44.35 + 40.47. Complete clinical data was available in 15 (68.18%) patients upto mean follow up of 83.42 months. There was 1 death due CS, one total occlusion and one repeat PTCA using cutting balloon.

Conclusions: Genous ™ bioengineered stent implantation in acute coronary syndrome was safe at short term and associated with high late loss during angiographic follow up at 8 months. Inspite of these features, late stent thrombosis and very late stent thrombosis was not seen during long term follow-up of 83.42 months duration.

Outcome of transradial primary angioplasty in octogenarians

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Background: Elderly people of age group > 80 years were excluded from randomized controlled trials of primary percutaneous coronary intervention (PPCI) in ST elevation myocardial infarction (STEMI) studies. There is paucity of outcome data of PPCI in octogenarian from this part of the world. We herein report the inhospital and thirty days outcome data of transradial PPCI in patients of STEMI and aged > 80 years.
Methods: In this retrospective study, all the patients of acute STEMI in the age group of > 80 years who underwent PPCI for STEMI through transradial route were identified. In hospital records were reviewed. Telephonic contacts with all the patients were made for confirmation of 30 days outcome.
Results: 14 octogenarians underwent PPCI for STEMI between February 2011 and June 2013. 2 patients underwent transfemoral PCI. Complete data was available in remaining 12 patients. Mean age was 84.5 + 15.6 (80-92 years). Majority were males – 8 (66%). Hypertension – 11 (91.6%), dyslipidemia – 8 (66%), diabetes mellitus – 3 (25%), family history of coronary artery disease - 3 (25%) and smoking – 2 (16%) were the risk factors present in the cohort. The median door to balloon time was 38 mins. 8 patients received 2nd generation drug eluting stent and remaining were treated with bare metal stents. The mean left ventricular ejection fraction were 32.5 + 18.5%. 4 patients had in hospital congestive heart failure. There was no death, recurrent MI, revascularization and rehospitalisation in these patients up to 30 days follow up.
Conclusions: We conclude that transradial primary angioplasty is associated with good in hospital and shortness outcome in the octogenarians. Retrospective nature, single centre data and small sample size are the limitations of our study.

Primary angioplasty for young adults (less than 35 years of age) with acute myocardial infarction - Clinical profile and outcome

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Background: Indians develop acute myocardial infarction (AMI) about 10 years earlier than western population. In addition, these young patients have different risk factor profile, clinical presentation and prognosis than older patients.
Aims and objectives of the study: To identify the demographic, clinical and angiographic profile of young (<35 years) Indian patients with AMI undergoing primary angioplasty and to assess inhospital and intermediate outcomes following PCI.
Materials and methods: The study was carried out at Apollo Health city, Jubilee Hills Hyderabad from January 2003 – June 2012. Of consecutive 780 patients who underwent primary angioplasty, 102 young patients (<35 years) were enrolled in the study. Randomly selected 102 patients of > 35 years were enrolled as controls. Patient demographic and risk factors were studied. The following clinical outcomes were analyzed – death, myocardial infarction, target lesion revascularization during hospital stay and during the follow up of 1 year after discharge from index hospitalization. Primary PCI was performed on to infarct related artery only. Use of GPIIb/IIIa receptor antagonist, thrombosuction device was as per the discretion of the operator.
Results: In our study, all the young patients were male (100% & 69%, p<0.001). The mean age in young group was 30 ± 5 years, in old age group was 50 ± 15 years. Among risk factors, diabetes mellitus (10.7% & 48%, p < 0.001) and hypertension (14.7% & 50.9%, p<0.001) were more common in older patients. Family history of CAD (44.1% & 10.7%, p<0.001), was more in young patients. Most of young patients were from urban areas (84.3% & 58.8%, p<0.001) and were working in corporate sector (85.2% & 50.9%, p<0.001). The young patients were more likely to present with chest pain (91.1% & 86.2%) and less likely to have heart failure (20.5% & 24.5%) (p=NS). The mean cholesterol level was 188±36.6mg/dl vs 206±32.4mg/dl, the mean LDL level 130±32.6mg/dl vs 142± 31.8mg/dl, the mean HDL level 35±8.1mg/dl vs 34± 7.8mg/dl, the mean triglyceride level 180±78.3mg/dl vs 192±65.3mg/dl (p=NS). On coronary angiography, single vessel disease was seen in 82.3% (n=84) in young age group vs 53.9% (n=55) (p < 0.05) patients in control. In hospital, four patients died in young group whereas eight patients died in older age group (p = 0.37). Three patients each from both groups had stent thrombosis requiring repeat PCI during hospital stay (p=NS). On long term follow up for one year, 8.3 % patients from young age group required a repeat PCI as compared to 17.4 % in older age group. Five patients in young age group developed repeat MI as compared to eleven in control group. Overall mortality at one year was 1.96 % vs 7.84 % patients (p=0.1).The present study
Conclusions: Younger patients presenting with AMI were male, smokers, staying in urban areas, working in corporate sectors, most of them presented with acute chest pain and were more likely to have single vessel lesion. There was trend towards better in-hospital and one year outcome in young patients.

Reused radial arterial sheaths in patients undergoing coronary angiography: Is it really safe as compared to new sheaths?

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Background: Percutaneous intervention through radial route is fast replacing the traditional femoral route but radial artery spasm, its occlusion and the pain involved are its major limitations.
Aims and objectives: There is a lack of published data on safety of reused radial arterial sheaths which prompted us to evaluate its safety via a prospective, observational study.
Methods: 1000 patients, undergoing radial angiography were prospectively randomized to either reused sheath group (n=493) or new sheath group (n=507). The incidence of radial artery spasm, arterial occlusion and pain scores during various time points of the procedure were recorded.
Results: There incidence of radial artery spasm were comparable in reused sheath group when compared to new sheath group (i.e. 21.9% vs. 17.95%, p=0.12 respectively). Conversely, the incidences of radial artery occlusion and catheter friction were significantly more in reused sheath group when compared with the new

sheath group (i.e. 6.92% vs. 2.17% and 15.01% vs. 7.89%; both p<0.001 respectively).

Significantly more number of patients in the reused sheath group felt discomfort as defined by pain score≥4 (out of a total pain score of 10), at sheath insertion [73(14.81%) vs. 52(10.26%), p=0.03, OR=1.52, 95%CI=1.04-2.22], during procedure[77(15.62%) vs. 46(9.07%); p=0.002, OR=1.85(95%CI=1.26-2.74)] and at sheath withdrawal[114(23.12%) vs. 77(15.19%), p=0.002, OR=1.68(95% CI=1.22-2.31)] when compared to the same in the new sheath group.

The procedural success rate was however comparable: i.e. 505(99.61%) in new versus 490(99.39%) in reused sheath group as opposed to new sheath group (p=0.98).

Conclusions: This study demonstrated that reused sheaths although demonstrate similar rates of radial artery spasm but increased rates of radial artery occlusion and catheter friction and although comparable procedural success rates. The pain involved during the procedure was however seen to be markedly higher in the reused sheath group. These differences do not seemingly affect the success of the procedure, therefore keeping in mind the cost-benefit ratio, the reuse of sheaths in percutaneous procedures should not be discouraged, if not recommended.

Endovascular management of traumatic pseudoaneurysm: Short & long term outcomes

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Background: Pseudoaneurysms as result of orthopaedic injuries are quite uncommon. But with increase in operative interventions and use of implants, its incidence is bound to increase. Selective angiography is a minimally invasive technique to pin point the diagnosis and at the same time allows for therapeutic intervention of the same.

Aims and objectives of the study: To review the outcome of traumatic pseudoaneurysms and to analyze the use of different endovascular techniques.

Methods: A retrospective review of inpatients from January 2007 to January 2013 requiring transarterial embolization / stenting for pseuoaneurysm in the limbs. All patients had evidence of pseudoaneurysm as proved by radiological findings. Angiographic intervention in a cath lab was performed, following which patients were monitored for morbidity and mortality benefits on short and long term follow up.

Results: Out of the total 14 patients; 8 adults and 1 child underwent embolisation with polyvinyl alcohol particle / soft metal coil, where as the remaining 5 adults underwent revascularisation with covered stent. The mean age of case series was 43.71 ±19.35 years. The mean follow up period of the group was 13.64 ±12.28 months. All patients showed significant clinical improvement with endsovascular management with no procedure related mortality but one patient required reintervention for residual pseudoaneurysm.

Conclusion: Endovascular management is the modality of choice in comparison to other procedures for traumatic pseudoaneurysms in both paediatric and adult patients.

Coronary Heart Disease

Balloon pulmonary valvuloplasty in CHD isolated valvular pulmonic stenosis

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Background: Balloon pulmonary valvuloplasty has been the first line of definitive treatment for congenital isolated valvular pulmonic stenosis. This study aimed to analyse the effectiveness of Balloon Pulmonary Valvuloplasty (BPV) in congenital isolated Valvular Pulmonic Stenosis (VPS).

Methods: This retrospective study included patients with congenital isolated VPS who underwent BPV from December 1988 to July 2013 in our institute. Those diagnosed to have more than mild VPS with peak instantaneous gradient across PV at least 50 mm Hg on transthoracic echocardiography were considered for BPV. Right heart catheterization including right ventriculogram was routinely performed to confirm the diagnosis and to rule out any significant infundibular stenosis. The size of the balloon chosen was 120 to 140 % of the diameter of annulus of Pulmonary Valve (PV) measured in lateral view of angiography. Intervention was declared as 'Successful BPV' when the right ventricle to pulmonary artery peak to peak gradient was reduced by 50 % or more at cardiac catheterization and as 'Partially Successful BPV' when the gradient was reduced by less than 50 %. All the patients were pretreated with beta-blockers.

Results: Out of 143 subjects planned for BPV based on echocardiography, 7 subjects were excluded following right ventriculogram and the remaining136 patients were included in our study. There were 63 (46.32 %) males and 73 (53.67 %) females including 51 (37.5%) children less than 12 years of age. The mean age was 18.7 years (range: 1 months to 50years). Balloon could not be negotiated through the stenosed PV in 3 (0.29 %) patients and the procedure was declared 'Failed BPV' in them. Among those who underwent balloon dilatation, single balloon technique was employed in 132 (97%) patients and double balloon technique in the remaining 1 (0.75%) patient. Balloons with step-up diameter were utilized in36 (27.1 %) patients. The mean of transvalvular peak to peak gradient measured before and after BPV was 102.45 ± 30.47 and 31.56 ± 17.73 mm Hg ($p < 0.0001$). The mean of percentage reduction in the gradient was 63.81 ± 11.49 %. Intervention resulted in 'Successful BPV' in 132 (92.32 %) subjects and 'Partially Successful BPV' in 8 (5.67 %) subjects. Out of 5 (3.74 %) patients with dysplastic PV, 'Partially Successful BPV' and 'Successful BPV' were seen in 1 and 3 patients respectively. The overall complications noted were vasovagal syncope in 8 (6.04 %) patients, complete heart block in 1 (0.93 %) patient, cardiac arrest in 1 (0.93 %) patient, left hemiplegia in 1 (0.93 %) patient and femoral vein thrombosis in 1 (0.93 %) patient. Patients were put on oral beta-blockers and followed up with annual echocardiographic assessment. There was further 30% reduction in the peak gradient and mild to moderate regurgitation of PV could be demonstrated in 64% % of patients. About 13 to 18 years later, 2 (1.87 %) patients developed 'Restenosis' (echocardiographic peak gradient across PV at least 50 mm Hg). Redo procedure resulted in 'Successful BPV' in them.

Conclusion: Our study underscores the fact that balloon pulmonary valvuloplasty is definitive curative therapy in congenital

isolated valvular pulmonic stenosis. The incidence of restenosis is truly low. On follow up, these patients do extremely well.

Intervention

Balloon coarctoplasty in infants presenting with native coarctation- emergency palliation or emerging treatment

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Background: Coarctation of aorta (CoA) in infancy generally presents with congestive heart failure (CHF) and needs early surgical repair. Balloon angioplasty (BA) is an alternative to surgical repair for CoA in children. However, its role in the treatment of native CoA in neonates and infants remains controversial.
Aims and objectives: Purpose of this study was to report the midterm outcomes of BA for native CoA in infants.
Methods: Between March 2011 and April 2013, 17 neonates and infants with native CoA who underwent BA were enrolled. Patients without recoarctation were designated as group A, while those with recoarctation or CHF were designated as group B.
Results: There were 13 patients in group A and two in group B. The mean age was 5.4±3.7 months (range 0.5-12 months) and the mean weight was 5.5± 2.2 kg (range, 3.0–10.5 kg). CHF improved markedly in all patients immediately after BA, with a reduction in systolic pressure gradient from 41.5±18.6 mmHg to 7.8±4 mmHg (p-value=0.001). The recoarctation rate was 13.3% (2/15).
Conclusion: The outcomes of BA for native CoA in neonates and infants were satisfactory with acceptable restenosis rates.

Comparison between prasugrel and clopidogrel in the patients undergoing percutaneous coronary intervention – A randomised controlled study

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Background: Platelet adhesion, activation, and aggregation play key roles in both normal haemostasis and pathological thrombosis. Clopidogrel plus aspirin dual antiplatelet therapy has become the standard of care for the support of patients undergoing PCI with stenting largely on the basis of a better tolerability profile. A growing number of studies have linked poor antiplatelet response to clopidogrel to adverse clinical outcomes, particularly coronary ischemia and stent thrombosis

From these limitations, the evaluation of more intensive and consistent antiplatelet therapy compared with clopidogrel has been studied. One such agent, prasugrel, a third-generation thienopyridine is the drug we decided to study & review.
Aims and objectives: To compare prasugrel, a new thienopyridine, with clopidogrel in terms of efficacy and safety profile.
Methods: we randomly assigned 984 patients with scheduled percutaneous coronary intervention to receive prasugrel (a 60-mg loading dose and a 10-mg daily maintenance dose) or clopidogrel (a 300-mg loading dose and a 75-mg daily maintenance dose), for 6 to 9 months. The primary efficacy end point was death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke. The key safety end point was major bleeding.
Results: The primary efficacy end point occurred in 8.2% of patients receiving clopidogrel and 6.7% of patients receiving prasugrel (hazard ratio for prasugrel vs. clopidogrel, 0.82; 95% confidence interval [CI], 0.73 to 0.90; P<0.001). We also found significant reductions in the prasugrel group in the rates of myocardial infarction (6.7% for clopidogrel vs. 5.4% for prasugrel; P<0.001), urgent target-vessel revascularization (2.5% vs. 1.5%; P<0.001), & stent thrombosis (1.4% vs. 0.7%; P<0.001). Major bleeding was observed in 1.8% of patients receiving prasugrel and in 1.6% of patients receiving clopidogrel (hazard ratio, 1.125; 95% CI, 0.83 to 1.28; P=0.07). Also greater in the prasugrel group was the rate of life-threatening bleeding (1.1% vs. 0.9%; P=0.06), including nonfatal bleeding (1.1% vs. 0.9%; hazard ratio, 1.25; P=0.23) and fatal bleeding (0.2% vs. 0.1%; P=0.04).
Conclusion: In patients with acute coronary syndromes with scheduled percutaneous coronary intervention, prasugrel therapy was associated with significantly reduced rates of ischemic events, including stent thrombosis, but without significant increased risk of major bleeding, but increased rate of fatal bleeding. Overall mortality did not differ significantly between treatment groups .Our results are comparable to the previous larger trials like TRITON-TIMI 38, except that that we didn't observe increased risk of major bleeding with prasugrel. Larger studies with large patient population and larger follow up period are necessary.

Usefulness of corsair micro catheter in antegrade approach for chronic total occlusion angioplasty

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Background: Corsair microcatheter (Asahi) is a hybrid over the wire catheter providing support and microcatheter functionality. Antegrade approach in CTO lesions is limited occasionally by inability to pass PTCA balloons and stents due to inadequate channel. Corsair microcatheter passes through microchannels due to unique design, increasing success rates
Methods: This study was conducted to study the feasibility and safety of corsair in CTOs using the antegrade approach. Patients presenting with symptomatic coronary artery disease were enrolled. Inclusion criteria were 1) angiographic evidence of CTO (TIMI= 0) duration>3 months; 2) a lesion crossed by a guidewire.15 patients (22 lesions) who underwent interventions for CTOs between 2011-2013 were enrolled in the study. Stepwise guide wires (Fielder FC, XT, Miracle 3,6) were used for antegrade wiring the CTO lesion. After wiring the target vessel the smallest balloon (1.1X10 acrostak) or a microcatheter was tried across the CTO site. Upon failing to cross the lesion corsair was used, subsequently serial balloon dilatations were performed and later stented with DES. Success was defined by a final TIMI grade 3. MACCE as death, Q wave MI and emergent CABG. Patients were followed for 1 year
Results: Procedure success was achieved in 20/22 lesions. There was no case of coronary perforation, stent thrombosis or urgent cabg.1 case had contrast nephropathy. On follow up 1 patient underwent target revascularization.
Conclusions: CTO angioplasty is rewarding with corsair usage, corsair in CTO is useful ante grade method. Without increasing chances of coronary perforation.

Patient no	15	No of lesions	22	pre pci	post pci	follow up	p value
M:F	12:03	second lesion	7	Hbgm% 12.4	12.4	12.5	ns
AGE	59±7.8	duration cto	1-11 yr	pcv 36.8%	38.60%	37%	ns
hypretension	14(93.3%)	lad	9	S.Cr mg% 0.9	1	1.1	ns
diabetes	12(80%)	lcx	6				
smokers	2(13.3%)	rca	7				
stable angina	11(73.3%)	procedure success	20/22(90.9%)				
ACS	4(26.6%						
IV dysfunction	4(26.6%)	Events in hospital		events in followup			
cabg	5(33.3%)	Acute stent thrombosis	0	TVR	1(6.6%)		
previous pci	4(26.6%)	urgent cabg	0	cabg	0		
		contrast nephropathy	1(6.6%)	death	0		
		coronary perforation	0	MACCE	1(6.6%)		

Incidence, predictors, and long term outcome of angiographic definite stent thrombosis in Indian sub-continent – A single centre study

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Background: The incidence of stent thrombosis (ST) in real-world practice is not the same as that observed in the various randomised trials. We evaluated the frequency, predictors and outcomes of ST.

Methods: In this prospective observational cohort study, 2632 consecutive patients who underwent successful percutaneous coronary intervention (PCI) were followed up for 1 year from the index procedure.

Results: The cumulative incidence of angiographic definite ST was 1.4% at 30 days and 1.7% at 1 year. ST elevation myocardial infarction was the presentation in 82.6% of the patients of which 21% were in cardiogenic shock. The independent predictors for angiographic definite ST were prior PCI, multivessel disease, emergent PCI, acute coronary syndrome and complex lesions. The incidence of ST at 1 year was found to be significantly higher with BMS than DES (OR-2.4, 95% CI:1.3-4.5). Overall mortality at mean follow-up of 13.9 months was found to be 36.9%, and 75% of them occurred during the index hospitalisation. Post procedural thrombolysis in myocardial infarction (TIMI) flow grade <3, and cardiogenic shock at the time of presentation were found to be the independent predictors of mortality after ST.

Conclusion: In real world scenario, the cumulative incidence of angiographic definite ST was higher than those observed in randomised trials. Compared with BMS, DES had significantly lower incidence of angiographic ST at 1 year, probably contributed by more use of second generation DES. Prognosis of ST is dismal, especially in those presenting in cardiogenic shock, or the ones who did not achieve TIMI 3 flow following PCI.

Usefulness of fractional flow reserve guided percutaneous coronary intervention in decision making and cost effectiveness: A real world scenario from developing country

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Objective: This study was devised in view of the real life application of FFR in catheterisation laboratory from a developing world country and to evaluate the cost effectiveness of the same.

Background: FFR has been proved to be superior to angiographically driven PCI in various studies also it has been proven to be economically beneficial. However there is difference between trials and real life situation. Considering this we conducted this study and evaluated clinical outcome and cost effectiveness associated with use of FFR.

Methods: We conducted a retrospective study which included all patients who underwent FFR in our hospital. Coronary angiograms of these patients were retrospectively analysed by two interventional cardiologists and decision regarding the lesion were made. The proposed decisions and their associated costs were compared with the actual procedure and costs incurred with the use of FFR. Also patients were evaluated for any adverse outcome after the procedure to the time of analysis.

Results: 38 patients underwent FFR in our hospital. 12 patients had SVD, 13 patients had DVD, 3 patients had TVD and 2 patients had LMCA disease. Mean FFR value in our study was 0.84±0.09 and 36.8% of all lesions had FFR≤0.80 and 16.2% had FFR 0.75-0.80. LAD was the most common vessel interrogated (27 patients). Total 42 lesions were analysed in 38 patients. Concordance between cardiologist opinion and FFR results were seen in 47.6% lesions. On basis of angiography alone intervention cardiologists decided 22 lesions to be stented but after estimation of FFR, 16 lesions were stented. Overall in 22 lesions decision was changed of which 14 lesions were deferred and 8 lesions were those which underwent PCI. On evaluation total cost of procedures as per decision of intervention cardiologist was found to be Rs 2603254 and actual total cost was Rs 2887954 with a difference of Rs 284700, which was not significant statistically. If further it was considered that FFR wire was used as guidewire for the patients who later underwent PCI after FFR, and cost of guidewire was reduced from the actual cost then Rs 207900 was the difference. Out of 38 patients we were able to contact 32 patients only. Mean duration of follow up was 12.7±7.14 mths. Amongst the 32 patients only 2 patients complained of class II angina. One patient later underwent CABG and was asymptomatic on follow up.

Conclusion: Despite few number of patients this study reinforces that clinical trials don't represent real life scenario and cost effective analysis may not be achieved in each set of situations. However, despite the increased cost we support the use of FFR for guiding revascularisation in intermediate severity lesions as it helps to classify these lesions correctly into significant or non significant. More so deferring of insignificant lesions and attending to significant lesions both are important to improve outcome.

Angiographic and risk factors evaluation of coronary artery disease in premenopausal female population

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Objective: This study was designed to evaluate the risk factors and angiographic profile of coronary artery disease in premenopausal females. Traditionally premenopausal females are thought to be at low risk for coronary artery disease but only few studies have been done to exactly look for the risk factors and angiographic picture in this subset of patients.
Background: Coronary artery disease in premenopausal females appears to have particularly poor prognosis. Evaluation of risk factors associated and relative importance of risk factors in this subset of population needs more studies.
Methods: We evaluated 100 premenopausal patients who presented with acute coronary syndrome or chest pain considered to be anginal in origin. Traditional risk factors were reviewed in all patients and association with angiographically detectable coronary artery disease was made. Also, cases were compared with age and sex matched controls who had normal coronaries.
Results: Out of 100 patients 33 patients presented with Effort Angina (EA), 15 with Unstable Angina (UA), 4 with NSTEMI and 48 with STEMI. The mean age was 45.67±6.28 years. Only 2 patients had no risk factors and 17 patients had all the 4 risk factors evaluated. Out of all cases 17 patients had normal coronaries, 16 had non-obstructive disease and 65 had significant disease. Amongst patients with obstructive disease 37 had SVD, 17 had DVD, 8 had TVD and 5 had significant LMCA disease. Among the traditional risk factors analyzed no significant difference amongst the three angiographic groups were seen. On comparative analysis between cases and controls significant difference was present with reference to diabetes, hypertension, total cholesterol, LDL, TG and BMI. After multivariate analysis DM ($p=0.016$), HTN ($p=0.000$) and BMI ($p=0.002$) were found to be significantly associated with the patient group.
Conclusion: Premenopausal females with coronary artery disease are not so uncommon entity as initially thought. These patients have high prevalence of conventional risk factors as compared to normal population. Majority of these patients had significant disease in our study. However conventional risk factors failed to predict the presence of angiographically significant disease in this group of patients.

A randomized comparison of Taxus Element vs Xience Prime in Indian patients with diabetes mellitus (TUXEDO INDIA)

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Background: The choice of DES in diabetic patients is still a matter of debate, data from registries and subset analyses of trials comparing paclitaxel eluting stents vs sirolimus and everolimus stents have conflicting results. There is no adequately powered study to answer this question.
Methods: TUXEDO India is an ongoing Investigator initiated randomized study comparing Paclitaxel eluting "Taxus Element" with Everolimus eluting "Xience Prime" in patients with diabetes mellitus on medical treatment. The inclusion criteria include multi vessel disease with up to 3 stents in different lesions. Stent lengths up to 38 mms are allowed to be used. Based upon previous data a sample size of 1830 patients are to be included.

The primary end point of the study is target vessel failure (Cardiac death, MI and target vessel revascularization) at 1 year. Stent thrombosis is a secondary end point. The enrollment for the study should be over shortly with 1610 cases already recruited. The follow up is ongoing.
Results: Demographic data of 1620 patients in is available. Mean age 59.0+9.2 years. Males 77 .6%. Insulin requiring diabetes 33.6% .ACS was present in (72.8%). Average stent length used was 23.75+7.19 mms with an average stent diameter of 2.91+0.35. Average number of stents used was 1.4+0.64.
Conclusions: The high risk diabetic patients with 33% requiring insulin were included in this study with implantation of long stents in a multi vessel scenario makes it a unique population. The details of the base line demographic features of this ongoing study comparing paclitaxel and everolimus-eluting stents will be presented.

Our experience with biovascular scaffold (BVS)

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Aim: To study clinical safety & efficacy of BVS.
Background: Bioabsorbable stents have altogether opened a new perceptive in coronary interventions and a debate on benefits over bare metallic stents and drug eluting stents. There had been difference of opinion from experts in this state of art over the technology, indications of usage, clinical benefits and economics. Although BVS are bulky & larger than DES (DRUG ELUTING STENT), BVS are promising alternative to permanent stents & may eventually be used to solve lingering problem of re-stenosis. Hence we decided to study BVS.
Methods: Between the months of JAN-JUNE 2013, we got an opportunity to deploy 20 BVS. Patients included 15 males (75%) & 5 females (5%) with mean age of 56.4 +/- 11.1 years. At baseline diabetes, hypertension, hypercholesterolemia & smoker patients were present in 8 (40%), 15 (75%), 16 (80%), 9 (45%) respectively. The patients included those who underwent primary PCI & RESCUE PCI. Out of 20 patients, 5 were Acute myocardial infarction cases, 3 were cases of in-stent re-stenosis in whom previously stenting was done with DES.

Key endpoints of the study include assessment of safety- MACE (Major adverse cardiac events) & stent thrombosis rates at 30 days; 6; 9, 12, 18 months & 2 years with additional annual clinical follow up for upto 5 years as well as an assessment of acute performance of the BVS including successful deployment of stent.
Results: The study demonstrated clinical safety of the BVS as there was only one ischemia-driven major adverse event (non-Q-wave MI) at 6 months. Incidence of in stent binary restenosis, MACE events were zero. In 1 patient with disease in large OM in whom proximal LEFT CIRCUMFLEX artery (LCX) was stented with DES previously , BVS could track easily after balloon dilatation of native LCX reaching the OM. Thus tracking in of BVS through stent struts into another branch is not an issue. Patients who underwent BVS implantation in AMI situations were doing well

clinically at 3 month follow up. BVS can be used in different clinical spectrum of Ischemic heart disease. Indications for BVS use will expand further with greater applicability in future. Late luminal enlargement due to plaque reduction without vessel remodelling needs confirmation from the outcomes of further detailed ongoing studies. Further follow up is required for study of duration of stent bio absorption, restoration of vasomotion, occurrence of late thrombosis. 1 year results of our ongoing study are awaited & will be published at a later date.

A single centre, multi-operator initial experience of 4,195 patients at a primary radial intervention programme in a primary care tertiary level centre

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Background: There has been an increase the acceptability and the number of the procedures via the radial approach. We present our experience pertaining to the clinical characteristics, procedural details and post procedural outcome of patients undergoing radial artery access, coronary angiographies over a period of 4 years at a primary care tertiary level centre.
Materials and methods: A retrospective analysis of all the coronary artery procedures during the last 4 years was done and the various parameters related to these procedures noted.
Results: In 4,195 procedures performed, success in radial artery procedures was achieved in 3,975(94.8%) procedures. The average puncture time and total procedure time was 9.5 $\pm$ 3 minutes (min) and 15 $\pm$ 2.5 min in the initial 500 patients, whereas the times taken in the final 695 patients were just 1.5 $\pm$ 0.5 min and 3.0 $\pm$ 1.5 min respectively. The total fluoroscopy time was not significantly different among the groups, when performed by an operator with training in the femoral route for angiography. Cardiology fellows needed more fluoroscopy time when mastering the radial route. Crossover of access sites was seen in 220 patients (5.2%).
Conclusions: Radial access coronary angiographies take less than 4.5 min, with first attempt radial artery access and negligible complication rates. Prior experience of coronary angiography helps in the reduction of fluoroscopy time during the learning curve.

The effect of bivalirudin on the outcomes of primary PCI in STEMI

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Background: The bleeding outcomes associated with the use of heparin with Glycoprotein IIb-IIIa inhibitors are known to cause an increase in mortality. Bivalirudin is being increasingly used as an alternative anticoagulant with lesser bleed risk and hence lesser mortality.
Aims and objectives: To study the difference between In hospital outcomes in patients who are admitted with STEMI and undergo primary PCI as revascularisation strategy who are administered unfractionated heparin or bivalirudin as part of the anticoagulation regimen
Method: Retrospective data from the hospital records of 198 consecutive patients with ST elevation myocardial infarction who underwent Primary PCI from October 2012 to June 2013, were studied. The in hospital outcomes of patients who received Bivalirudin alone as the anticoagulant during Primary PCI was compared with the group of patients who received Unfractionated Heparin with provisional use of GpIIb –IIIa inhibitors. The primary end point was Major Bleeding and Net adverse cardiac events (composite of Major Bleeding and Major Adverse Cardiac Events, which is defined as a combination of death, reinfarction, Target vessel revascularization for ischemia, and stroke) during the hospital stay
Results: In the setting of Primary PCI, the use of Bivalirudin in comparison to the use of Unfractionated heparin, with provisional use of GpIIb- IIIa inhibitors , caused reduced rates of In hospital Net Adverse cardiac events (6.45 % vs 13.6 %, p= 0.10) . The all cause mortality was 3.22% vs 4.04% (p = 0.96). The incidence of stent thrombosis in the bivalirudin group vs heparin group was 3.2% vs 3.03% (p = 0.23). The comparison of TIMI Major bleed in the two groups was 0 vs 4. There were 7 cases of TIMI Minor Bleed (3.53%), 1 case of stroke (0.5%)and 1 case of reinfarction (0.5%) in the heparin group as compared to no such events in bivalirudin group.
Conclusions: The incidence of Net adverse cardiac events was lesser in the Bivalirudin group, chiefly because of the low bleeding events. The major bleed events in Heaprin arm were associated with use of GpIIb-IIIa inhibitors, as tirofiban. The net event rates indicate bivalirudin can be used safely in our population.

Comparison of the Framingham 10 year risk score with a new algorithm (Jai Heart) for the estimation of coronary heart disease risk: A nested case-control study of 2068 subjects from the Indian Atherosclerosis Research Study

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Background: India, the rest of South Asia and the Middle East are estimated to have amongst the highest prevalence and incidence rates of coronary heart disease (CHD) in the world. However, there are few, if any, clinically validated total risk estimation algorithms developed specifically for South Asian and Middle Eastern populations. Furthermore, conventional risk factors alone do not appear to account for the higher incidence, severity and earlier onset of CHD observed in this region. Using data from published studies and databases including Asian, Middle Eastern and African subjects, we have developed a new CHD risk estimation algorithm, Jai Heart, that incorporates age, gender, ethnicity, 9p21 allelic status, smoking status, diabetes, family history of premature CHD, antihypertensive treatment, body mass index, systolic blood pressure and ratio of total cholesterol to high-density lipoprotein level.
Aims and objectives of the study: To compare CHD risk estimation using the Framingham score against the Jai Heart model in the Indian population.
Methods: A nested case control study was conducted within the Indian Atherosclerosis Research Study (IARS), a case-control and ongoing prospective cohort study of 11,963 subjects investigating risk factors for CHD in the Indian population led by the Thrombosis Research Institute. 1034 cases with confirmed CHD and 1034 age and gender matched controls were selected from the IARS

population with the availability of conventional Framingham variables (age, gender, smoking status, blood pressure and cholesterol) plus 9p21 allelic status (rs10757278), diabetes history, family history of premature CHD, anti-hypertensive treatment and body mass index. The 10 year risk of CHD was calculated for each participant using both models. The main outcome measure was the odds of being a case of CHD given a Framingham or Jai Heart 10 year risk score ≥20%.

Results: The mean Framingham 10 year score was 6.70 % for cases and 6.17% for controls (p=0.034). The mean Jai Heart 10 year risk score for cases was 23.08% and for controls 15.05% (p<0.001). The odds ratio for the Framingham score was 1.22 (0.88-1.70, p=0.24). Odds ratio for Jai Heart score was 2.82 (2.35-3.40, p<0.001). The odds ratios for the comparison of quartiles for Framingham scores were significant only for Q4 vs. Q1: 1.32 (1.03 − 1.69). Odds ratios for quartile comparisons for Jai Heart scores were significant across all quartiles: Q2 vs. Q1 1.83 (1.42-2.37), Q3 vs. Q1 2.84 (2.20-3.66) and Q4 vs. Q1 5.12 (3.93-6.66).

Conclusions: The Jai Heart risk score is potentially superior to the Framingham risk score at identifying those at a high risk (≥20%) of CHD in this study population. The Jai Heart model represents a viable option for CHD risk estimation in the Asian, Middle Eastern and African populations for which it has been designed.

NT pro BNP (N Terminal pro Brain Natriuretic Peptide) as a potential marker of disease severity and adequacy of Percutaneous balloon mitral volvotomy (PBMV) in rheumatic mitral stenosis (MS)

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Background: Rheumatic heart disease is still a common problem in developing countries. NT pro BNP is widely used as a marker of CHF. Plasma BNP levels are affected in rheumatic heart disease, and can be correlated with disease severity and adequacy of PBMV

Aims and objective: To correlate levels of NT pro BNP with clinical, echocardiographic and hemodynamic parameters of MS severity and to correlate levels of NT pro BNP with adequacy of PBMV.

Methods: A total of 36 patients undergoing PBMV and 10 normal control subjects were enrolled in the study. All enrolled subjects underwent detailed history and physical examination. All the tests were done within 12 hours of PBMV and were repeated 12 hours post PBMV and 1 month PBMV.NT pro BNP levels were also done within 12 hours before PBMV , 12 hours after PBMV and 1 month post PBMV. Treadmill test was done to test the exercise capacity pre and post PBMV. All enrolled subjects underwent 2 dimensional conventional Doppler, and tissue Doppler imaging. Transthoracic echocardiography was performed using Vivid 7 echocardiographic unit (General Electric) for tissue Doppler imaging. Tissue Doppler Echocardiography derived Strain and Strain Rate imaging were used for assessment of LA regional longitudinal function using apical 2- and 4-chamber views of the LA before PBMV and post PBMV at day 1,and at 1 month. Peak Strain and Strain Rate were measured at each mid-LA segment (septal, lateral, anterior, and inferior) during ventricular systole (LAs) and at early (LAe) and late diastole (LAa). LAA contraction velocity was calculated using trans esophageal echocardiography and correlated with NT pro BNP levels. Invasively cardiac output was calculated using swan gauz cardiac output catheter. PCWP, pulmonary artery pressure and other cath data were correlated with NT pro BNP levels pre and post PBMV.

Results: NT pro BNP levels correlated significantly with the severity of disease symptoms, the functional capacity, echocardiographic findings and hemodynamic data. (p<.05). Strain at each mid-LA segment (septal, lateral, anterior, and inferior) during ventricular systole (LAs), at early (LAe) and late diastole (LAa) were significantly lower in the patients than in the controls ($P < 0.0001$). During all 3 periods, most of the segment Strain Rate values were significantly lower in the patients than in the controls ($P < 0.05$). Post PBMV, mean transmitral pressure gradient dropped significantly from 15.4±4.7 to 4.6±1 mmHg ($p < 0.05$) that correlated significantly with NT pro BNP levels. Strain and Strain Rate values improved significantly ($p < 0.05$) in most segments at day 1 and were significantly improved in all segments during all 3 periods at post PBMV 1 month.

Conclusion: NT pro BNP levels correlate significantly with the severity of MS and also with adequacy of PBMV.

A comparison of clinical outcome of two pharmaco-invasive strategy post-thrombolysis in STEMI: PCI within 24 hour versus PCI before discharge

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Background: Primary PCI is presently the gold standard for the treatment for patients with STEMI. But it is still not available in our set-up round the clock. So, a method of various pharmaco-invasive strategies has been developed. Facilitated PCI within 3 hours of thrombolysis or various reperfusing agents, historically has been failed. So, **adjunctive PCI**, ie PCI within 3-24 hours of reperfusing agent, and **early elective PCI**, ie PCI from 24 hours to before hospital discharge, has becoming the de facto treatment strategy. Direct comparison of these two strategies is lacking, that's why this study is planned.

Aims and objectives: To compare the clinical outcomes of two pharmaco-invasive strategy post thrombolysis in STEMI, ie PCI within 24 hour versus PCI after 24 hour but before discharge.

Methods: A total of 40 patients in adjunctive PCI group and 60 patients in early elective PCI group are included. All the patients underwent detailed history taking to meet inclusion or exclusion criterias. They are meticulously examined at the time of presentation. Then patients were thrombolysed if there is no contraindication. Then they underwent 2-D Trans-thoracic Echocardiography (Vivid 7 echocardiographic unit General Electric). The patients underwent PCI of infarct related artery. They were followed for 30 days. At the end of 30 days they were again interrogated and examined for: any cardio-vascular mortality, re-myocardial infarction, angina leading to hospitalisation, any heart failure hospitalisation, improvement in global cardiac function by 2-D Echocardiography and functional NYHA class.

Result: There is no difference in cardiovascular mortality between the two study groups (p>0.05). Re-Myocardial infarction and angina or heart failure leading to hospitalisation was not significantly different between the two study groups (p>0.05). There was overall improvement in LVEF as compared to predischarge LVEF, but it was not significantly different between two groups (p>0.05). There is improvement in NYHA functional class as compared to

predischarge in both groups but again insignificant between two groups ($p>0.05$)
Conclusion: In our set-up where primary PCI is not readily available, pharmaco-invasive strategy is a valuable option, even when there is much delay in transfer to PCI capable centre after thrombolysis. Even after 24 hour, PCI can be done with comparable outcome as compared to PCI within 24 hour.

Approach to stent thrombosis following primary PCI: A single-unit experience

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Background: Acute & subacute Stent thrombosis (ST) occurring within the index hospitalization is a rare but potentially catastrophic complication following PCI for acute STEMI. The management of such early ST (EST) is challenging, and can be pharmacological (thrombolysis) or mechanical involving aspiration thrombectomy (AT) with plain balloon angioplasty (PBA) or repeat stenting (RS) to plaster the stent thrombus. We present our single-unit experience in dealing with this problem over the last 10 years.
Material & methods: We retrospectively analysed the cases of EST in the last 10 years. Our protocol was to review the PPCI result to ascertain if there was mechanical failure (MF) or not. Suspicious edge dissection, residual stenosis or suboptimal result were considered MF; these were taken up for repeat intervention. AT and PBA was done in all; stenting was done for suspicious edge dissection or if PBA didn't yield satisfactory result. EST with very good initial result was presumed to be due to pharmacological failure (PF) and was treated with IV thrombolysis with Tenecteplase, followed by angiography after 24-48 hours. Platelet function assay was not done in any.
Results: There were 8 cases of EST (8 out of 300 cases; 2.66%). 6 were male and 2 female (age group 46-78 years). Aspirin, Heparin were used in all; the second antiplatelet agent was Clopidogrel in 7 and Ticagrelor in 1. Eptifibatide was used in all of these. BMS was used in 6 and DES in 2. Single stent was used in 6, 2 had overlapping stents. Branch vessel occlusion of diagonal or RV branch occurred in 4 of these. 6 presented between 24 and 48 hours after PPCI; 2 between 48 and 96 hours. 1 had recurrence of ST 48 hours after repeat stenting. Vessel involved was LAD in 6 and RCA in 2. 5 with MF underwent AT & PBA but only 2 needed RS. 3 with PF successfully reperfused with Tenecteplase and angiography revealed patent stents without any residual problem. 5 needed inotropic supports including IABP in 2. LVEF pre-discharge was 32% - 55%. There was no mortality in-hospital or within 1 month. Clopidogrel was changed to Prasugrel in 1, Ticagrelor in 2 and Ticagrelor was changed to Prasugrel in 1. Cilostazol was added to all patients.
Conclusions: Early ST following PPCI is rare but responds well to treatment. Ascertaining if there was mechanical failure at PPCI helps guide treatment approach. Repeat stenting is needed in 25%; thrombolysis yields good success in presumed PF owing to the "pure clot" occlusion situation. Checking PFA can probably help choose the management strategy as well as reduce the incidence of EST.

"Reverse Jailing" – A rare phenomenon in primary PCI (PPCI)

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Background: PPCI for management of acute STEMI is becoming more popular in our country. PPCI throws up some rare challenges, not usually encountered in planned PCI in stable settings. Side branch occlusion during main culprit vessel stenting is a well recognised entity in this setting. Herewith, we are reporting a rare, previously unreported phenomenon during PPCI, which we call "Reverse Jailing"
Aims and objectives: "Side branch jailing" during main vessel PCI is a known phenomenon and likely when plaque / thrombus burden is more and ostium of side branch is also diseased, the severest form being total occlusion of side branch. We report here the opposite phenomenon of side branch jailing, wherein a total ostially cut-off side branch opens up very well following main vessel stenting. We call it "Reverse Jailing" phenomenon. We present the incidence and features of reverse jailing phenomenon in our PPCI series.
Methods: We have done a retrospective analysis of the last 100 primary and rescue PCI (failed thrombolysis) done over the last 4 years. Among 100, 62 were male patients and 38 were female patients. 53 patients had AWMI, 42 had IWMI and 5 had AWMI and IWMI. 58 had diabetes, 38 had hypertension, 75 had dyslipidemia, we analysed all the PCI angiograms specifically looking for disappearance or appearance of side branches arising from the culprit lesion area following main vessel PPCI treatment. Side branches sized more than1 mm only were taken up for analysis.
Results: In all our PPCIs, we follow MICA (Minimally Invasive Coronary Angioplasty) technique. In the majority of our PPCI, Direct stenting was done (90%) and in 10% mini predilatation was done. The incidence of side branch closure was 6%. "Reverse Jailing" phenomenon was seen in 4 patients. In 2 patients, the initially occluded diagonal branch got opened after LAD stenting. In 1 patient, the PDA branch got opened following RCA to PLB stenting. In 1 patient, where the stent was placed in LAD to Diagonal, previously occluded LAD opened up. The angio films will be shown during presentation. The likely mechanism is the disruption of ulcerated plaque/spiral dissection involving origin of side branch getting sealed by stenting leading to good flow into the previously occluded branch vessel. No attempt was actively made for entering the occluded branch vessels.
Conclusion: "Reverse Jailing" phenomenon has not been reported so far in the literature. The practical importance of this phenomenon is that one need not pursue side branch treatment in totally occluded side branches until after the main culprit vessel has been treated, as this step itself could open up the side branch.

Long term clinical outcome after percutaneous coronary intervention in chronic total occlusion

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Background: Chronic total occlusion (CTO) of coronary arteries is one of the most challenging PCI, usually defined as more than three-month-old obstruction of a native coronary artery. Percutaneous transluminal coronary angioplasty (PTCA) for chronic totally occluded coronary arteries is associated with a significant residual stenosis and a high incidence of restenosis.
Aim: The aim of the study was to evaluate the short and long term outcome of patients of CTO undergoing percutaneous coronary intervention (PCI) in a single center.

Method: A retrospective analysis of 422 patients with CTO undergoing PCI between 2006 to July 2013 was done. Data were retrieved from a computer generated software regarding demographics, coronary anatomy, procedural success, procedural technique, last available follow up entered into the system on day to day basis. Procedural techniques, success and short and long term major adverse cardiovascular events (MACE) including cardiac death, myocardial infarction and target vessel or non-target vessel revascularisation (TLR) were assessed.
Results: Mean age was 56.6years(87% were male). Radial approach was done in 179 (42%), femoral approach in 201 (48%) and combined femoral and radial approach for contralateral injection was done in 81 (19%). 30% were diabetic. CTO vessel distribution – LAD in 164 (39%), LCX in 110 (26%) and RCA in 148 (35%) cases. 238 (51%) were having single vessel disease, 159 (38%) were double vessel and 25 (6%) were triple vessel disease. Mean number of stents used per patient was 1.63 and mean length of the stent was 31.3 ± 11.6 mm. Average volume of contrast used was 295ml (150 ml to 800ml). Retrograde wire technique was used 25 (0.5%) patients. In 367 (87%) technical success was achieved. Technical success was defined as the ability to cross the occluded segment and successfully open the artery with a < 40% residual stenosis and TIMI 3 flow. There were 3 deaths (2 due to cardiac tamponade and 1 due to acute closure due to subintimal passage of wire). Clinical follow up data of 259 (65%) is present with mean follow up 24.2 ± 12.45 months. In follow up 30 patients were symptomatic. Follow up angiography was performed in all these cases which revealed in stent restenosis in 14 (3%). In follow up 2 cases developed stent thrombosis and total death in follow up were 2.
Conclusion: Elective coronary stenting following successful recanalization of chronic total occlusion produces good immediate result and reduces the recurrence of angina, target lesion revascularization and angiographic restenosis on long-term follow-up.

Effect of primary percutaneous coronary intervention on arrhythmogenic parameters like QTc, QT dispersion and T wave peak to end time changes in patients of acute STEMI

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Background: Acute STEMI is associated with significant arrhythmia or cardiac arrest. QT prolongation can occur in the setting of ischemia or acute STEMI as a risk factor for arrhythmia. The importance of dispersion of repolarization in the genesis of ventricular arrhythmias has been shown in both experimental and clinical electrophysiologic studies.
Aims and objectives: The goal of this study was to evaluate the effect of primary percutaneous coronary intervention (PCI) in acute STEMI patients on arrhythmogenic parameters like corrected QT interval (QTc), QT dispersion (QTd) and T wave peak to end (TPE) times.
Methods: In this study we enrolled a total of 186 patients (130 males, 56 females) of acute STEMI who were eligible for primary PCI. All patients underwent successful PCI with TIMI flow grade 3 post PCI with a door to balloon time of < 90 minutes. The QT data were manually measured with a ruler at admission and 24 hours after primary PCI. To exclude the effect of heart rate on QT interval, the QT interval was corrected according to the Bazett formula. The end of T wave was considered the point of return to the iso- electric line. ECGs in which QT interval was not measurable in more than 8 leads were excluded from the study. Other exclusion criteria were history of prior MI, atrial fibrillation, QRS > 120 ms or any drugs affecting QT intervals.
Results: After primary PCI we found that there was a significant reduction in QTc (mean 470±35 vs 430±30; $p < 0.001$), QTd (mean 95±4.0 before PCI vs 65±3.5 after PCI; $p < 0.001$) and TPE (mean 95 ±2.5 ms before PCI vs 70±2.5 ms after PCI; $p < 0.001$).
Conclusion: Our findings suggest that ischemia induced QTc, QTd and TPE are important arrhythmogenic parameters responding to successful primary PCI. These parameters may be used as simple and non-invasive markers for successful reperfusion and clinical outcomes.

The predictors of outcome of out of hospital cardiac arrest in territory care center

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Background: OHCA (out of hospital cardiac arrest) is a leading cause of death in first world countries. OHCA patients depends upon number of variables. However, in India, there is not much data available on outcome of OHCA. There is need to analyze that data so that adequate intervention can be done to further improve outcome.
Aims and objectives of the study: To study the outcome in survivors of out of hospital cardiac arrest (OHCA) in territory care centre of North India and to analyze role of various clinical and biochemical parameters in predicting outcome.
Methods: This prospective study was done in emergency of Dayanand Medical College & Hospital, Ludhiana over one year. Patients who were admitted after OHCA and revived following CPR were enrolled for the study. The clinical, biochemical and demographic parameters of the patients were noted and correlated with the outcome.
Results: A total of 49 patients were admitted after out of hospital cardiac arrest to the emergency. 18 (36.73%) patients survived to hospital discharge and 31 (63.26%) patients expired or took discharge in a critical condition and ultimately expired. The mean age of patients was 58.06 ± 15.13 years and males constituted 67.35%. Diabetes was the most common comorbidity. Mean time to arrest to hospital was 7.44 ± 6.86 minutes (survivors) compared to 13.23 ± 8.06 minutes (non survivors) (p value = 0.009). Mean duration of stay was more among discharged (p value = 0.006). Patients presenting with VT/VF (p value = 0.003) as first monitored rhythm compared to asystole (p value = 0.004) had better outcome. The data showed that VT/VF, duration of hospital stay, raised urea and creatinine, time to arrest to first help and hospital were predictors of good outcome. There was no role of bystander CPR in predicting outcome in our study.
Conclusion: The present study concludes that the shorter interval from arrest to reaching the hospital and shockable rhythm were associated with better outcome in patients of OHCA (out of hospital cardiac arrest).

Non-invasive assessment of right ventricular function in patients of rheumatic mitral stenosis and immediate effect of percutaneous transvenous mitral commissurotomy on it

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Background: Mitral stenosis (MS) affects right ventricular (RV) function as a result of myo-cardial and hemodynamic factors. RV function is the major determinant of clinical outcomes.
Aims and objectives: The aim of this study was to evaluate RV function in rheumatic MS patients and to evaluate the immediate effect of percutaneous transvenous mitral commi-ssurotomy (PTMC) on it. And whether it can be a criteria for early intervention in patients of rheumatic MS in whom there is difficulty in assessing pulmonary hypertension.
Methods: In this study we enrolled a total of 86 consecutive patients (58 females, 28 males) with isolated rheumatic MS, all in sinus rhythm, undergoing PTMC between August 2011 to July 2013. Patient's mean age was 24±7 years. All patients underwent successful PTMC by anterograde trans-septal approach using an Inoue balloon. Right ventricular systolic pressure (RVSP) and tricuspid annular plane systolic excursion (TAPSE), a parameter of RV longitudinal function were assessed by conventional echocardiography, while peak systolic (Sm), peak early diastolic (Em) and peak late diastolic (Am) annular velo-cities of tricuspid valve annulus were assessed by tissue Doppler imaging echocardiography. All these parameters were assessed before and on the next day after PTMC.
Results: Next day after successful PTMC, TAPSE increased from 16.11±2.1 mm to 19.13±2.59 mm ($p< 0.05$), Sm increased from 10.30±1.6 cm/s to 13.26±1.37 cm/s ($p< 0.05$) and Em/Am ratio increased from 1.15±0.12 to 1.57±0.17 ($p< 0.05$). There was a significant decrease in RVSP from 56.4±18.6 to 27.2±11.4 ($p <0.05$) post PTMC.
Conclusion: TAPSE and tricuspid annulus tissue Doppler indices were able to assess RV dysfunction in rheumatic MS patients and they were significantly improved in the immediate post PTMC period. So,the assessment of RV dysfunction can be a simple, non-invasive criteria for intervention in patients of rheumatic MS specially in those patients in whom there is difficulty in assessing pulmonary hypertension. Though further work using larger number of patients is needed to confirm our findings.

"Hemoptysis as sentinel bleed" – A "Diagnostic red flag" of aortic pseudoaneurysm

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Background: Hemoptysis is a common symptom in several lung diseases. An extremely rare cause of hemoptysis is a leaking aortic aneurysm (AA) or pseudoaneurysm (APsA) with aortobronchial fistula. This possibility is almost never considered in the doctor's office or in emergency room (ER) due to its rarity. However, in certain situations such as previous aortic surgeries for PDA or Coarctation, or in previous road traffic accidents (RTA), Aortic PsA is common and should be thought of as an important first diagnosis. Hemoptysis due to aortobronchial fistula can initially be very mild owing to the serpiginous fistulous tract in inflamed tissues. This could be a "sentinel bleed" heralding a massive exsanguinating bleed later and should be acted swiftly upon.

We report a rare case where a patient presented to us with an episode of hemoptysis as a sentinel bleed, due to leaking post-traumatic Psuedoaneurysm of Aortic isthmus. He also had multiple challenging problems and was successfully treated with hybrid thoracic endovascular aneurysm repair (TEVAR).
Case report: A 52 year old diabetic, hypertensive gentleman presented to ER with history of mild hemoptysis for 2 days with fever and mild backache. He was treated for chest infection and a routine cardiac evaluation was sought. There was past history of road traffic accident before 19 years with multiple left rib fractures and leg fractures needing orthopaedic surgery. He had chronic osteomyelitis following that and was on intermittent antibiotics for 3 years.

Initial clinical evaluation in ER was unremarkable but for tenderness over lumbar spine. Chest X ray showed mediastinal widening with calcification of aortic isthmus area. CT thorax and abdomen revealed calcified thoracic aortic PsA abutting the left subclavian artery (LSCA). There were multiple challenges in the treatment:

Blood culture revealed MRSA. Open repair was considered very risky and TEVAR was chosen with antibiotic cover for 1 year.

LSCA had to be covered by the stent graft as the proximal landing zone was insufficient, needing common carotid subclavian grafting prior to TEVAR

Left vertebral artery (LVA) had separate origin just before the LSCA and its jailing had to be avoided

Both femoral and external iliac arteries were only 5 mm sized needing extraperitoneal conduit placement to aid TEVAR procedure

A team of endovascular specialist, vascular surgeon, cardiothoracic surgeon, orthopaedic surgeon and infectious diseases specialist was involved in the management. Hybrid procedure with operative debranching of LSCA with carotid bypass and right common iliac conduit was done followed immediately by TEVAR in cath lab using 30/30/150 mm self-expandanble Valiant proximal free flow stent graft (Medtronic, USA) covering the LSCA and sparing the LVA. Check aortography at 6 months revealed no endoleak.
Learning points: Hemoptysis in those with a remote history of RTA could be due to a ruptured aortic isthmus pseudoaneurysm with aortobronchial fistula. Even mild hemoptysis in this setting is very important as this could be a warning "sentinel bleed" for a catastrophic exsanguinating bleed later.

Assessment of early radial artery injury by high-resolution ultrasound after transradial coronary intervention

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Background: Although transradial coronary intervention (TRI) has been developed to minimize the bleeding and to improve the quality of life, radial artery injury is a problem. The present study was undertaken to compare the early radial artery injury after TRI between first-TRI and repeat-TRI by high resolution ultrasound.

Methods & results: A total of 83 patients who are undergoing coronary angiogram through transradial route were included. We compared the radial artery findings between first-TRI patients (n=63) and repeat TRI patients (n=20). The Radial Artery (RA) was examined by ultrasound before and one day after the procedure.
Results: Compared with first-TRI group, the mean Radial Artery (RA) diameter of repeat-TRI one day after the procedure decreased significantly (p 0.005). In first-TRI group, the mean RA diameter was (2.2±0.35) and (1.7±0.37) mm before procedure and one day after the procedure respectively (p 0.005). In repeat-TRI group, the mean RA diameter was (2.1±0.6) and (1.6±0.36) mm before procedure and one day after the procedure, respectively (p 0.005). The early radial injuries and intimal thickening were compared between first-TRI and repeat- TRI. The mean intima-media thickness of RA was (0.4±0.22) mm and (0.59±0.13) mm before procedure and one day after the procedure in first-TRI group. The mean intima-media thickness of RA was (0.48±0.29) mm and (0.68±0.27) mm before procedure and one day after the procedure in repeat-TRI group. Compared with first-TRI group, the mean intimal thickening was increased significantly in repeat-TRI group one day after the procedure (p 0.06). Linear regression analysis revealed that diameter, repeated TRI procedure were the independent predictors of the intimal thickening.
Conclusion: The lumen diameters were smaller in repeat-TRI patients than in first-TRI patients due to intima-medial thickening, in the radial artery. Care should be taken when the radial artery is used as a conduit in coronary artery bypass graft surgery, particularly in patients who have undergone TRI.
Keywords: Transradial Coronary Intervention (TRI), Radial Artery, High-resolution ultrasound.

Study of clinical profile and atherosclerotic risk factor assessment in slow coronary flow with normal coronary angiogram

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Background: Angina pectoris is usually caused by atherosclerotic narrowing of the epicardial coronary arteries. In up to 20 percent of patients with anginal chest pain, the coronary angiogram does not reveal a significant narrowing of the epicardial coronary arteries. Slow Coronary Flow (SCF) is a phenomenon in which there is a delayed opacification of epicardial arteries in the absence of occlusive disease. Although the pathogenesis of this syndrome is controversial, several studies have suggested that it is mainly caused by endothelial microvascular dysfunction. There is also a correlation between SCF and abnormal atherosclerotic parameters.
Aims & objectives: This study was designed to evaluate the clinical profile & atherosclerotic risk factor assessment with slow coronary blood flow, in patients who have normal coronary angiogram
Methods: This is a prospective, single center registry which enrolls all patients with slow coronary flow and normal epicardial coronary angiograms recruited from cardiology wards and outdoor cardiology clinics of PGIMER & Dr RML Hospital, New Delhi due to unstable angina or non specific chest pain, between April 2012- April 2013.A total 110 patients were enrolled in the study in the above mentioned period. And 50 controls age matched subjects with no evidence of Ischaemic heart disease from general medicine OPD on the basis of history and basic investigations Out of 110 patients 66(60%) were male and 44(40%) were female with mean age group of 58±12 years.

Each patients' s angiogram was evaluated for TIMI flow grade, corrected TIMI frame count (CTFC) and Clearance scores. Since the Left Anterior Descending (LAD) artery is the most important artery and its blood flow is highly correlated to other coronary arteries flow, we continued the statistical analysis in reference to the CTFC of the LAD. The Corrected TIMI Frame Count (CTFC) and the Clearance rate score were highly correlated. There was also a high degree of correlation between the different blood vessels. Apo B and Apo A-1 will be determined by immune electrophoresis, and Lp (a) will be determined by immune radiometric assay.
Results: Retrospective analysis of risk factors assessment in these patients revealed that out of 110 patients 22patients ie 20% had family history of coronary artery disease, 66 patients ie 60% were chronic smoker, dyslipidemia was found in 33 ie 30% of the total cases. History of diabetes mellitus type 2 was present in 45 ie 41% and hypertension was present in 50 ie 45% of the cases. Abnormality in newer atherosclerotic markers like increased values of Lpa, hs CRP, Apo B/Apo A were found in 65 ie 59% of cases.
Conclusion: In patients with normal coronary arteries, slow flow is highly correlated to the presence of known atherosclerotic risk factors with highest correlation to current Smoking status.

Echocardiography

Prevalence of CAD in valvular and non valvular cardiac pathologies undergoing surgery

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Background: The prevalence of coronary artery disease (CAD) in patients undergoing surgery for valvular heart disease (VHD) varies widely among studies. The objective of the present study was to determine the prevalence of CAD in patients undergoing surgery for various valvular as well as non-valvular cardiac pathologies.
Methods: From October 2011 to January 2013, 300 patients, with various valvular and non-valvular pathologies were identified and selected for the study. All patients with age $\geq$ 40 years and an indication for open heart surgery underwent pre-operative coronary angiogram and were included in the study. Significant CAD was defined as coronary stenosis $\geq$ 50%
Results: The mean age was 51.5 $\pm$ 9.02 years. 178 (59.3%) patients were males and 122 (40.7%) patients were females. Out of 300 patients, 270 (90%) patients had VHD and 30 (10%) patients had non-valvular heart disease (NVHD). Rheumatic heart disease (RHD), mitral valve prolapse (MVP), degenerative aortic valve disease (DAVD) and bicuspid aortic valve (BAV) was present in 161 (53.7%), 17 (5.7%), 60 (20%) and 32 (10.7%) patients respectively. Patients with DAVD were significantly older (mean age 61.7±7.04 years, $p<0.001$) and more males (42 patients, 70%, $p<0.05$). Overall, 26 (8.7%) patients were found to have significant CAD. CAD was significantly more common in VHD patients (25 patients, 9.3%) as compared to non-valvular etiologies (1 patient, 3.3%, $p<0.05$). In the valvular group, DAVD patients had maximum incidence of CAD (14 patients, 23.4%, $p<0.05$). There was no significant difference in the prevalence of CAD in patients with RHD (4.9%), MVP

(5.9%), BAV (6.2%) and non-valvular etiologies (3.3%). In the group with CAD, the presence of variables such as age >60 years, male sex, typical angina, HT, dyslipidemia and smoking was significantly greater as compared to those with normal coronaries.
Conclusion: The overall prevalence of CAD in the present study is 8.7%. The prevalence of CAD among rheumatic VHD patients is low, whereas it is high among those DAVD.

Role of myocardial contrast echocardiogram in detection of coronary artery disease in new onset acute heart failure

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Background: Myocardial contrast echocardiography (MCE) is a recent non invasive imaging tool for evaluation of coronary perfusion of the myocardium and is less well studied in heart failure patients to differentiate ischemic and non ischemic cardiomyopathy. Differentiation has prognostic implications in the management and can avoid unnecessary angiograms in these patients. Safety of myocardial contrast agent is well established.
Objectives: To assess the sensitivity, specificity, positive and negative predictive value of myocardial contrast echocardiogram in detecting myocardial perfusion defects in patients presenting with heart failure assessed with coronary angiogram as the gold standard.
Methods: 27 patients presenting with new onset decompensated heart failure were included in the study. Patients with prior myocardial infarction, those below 18 years, who were moribund enough that coronary angiogram could not be performed and patients with bleeding diathesis were excluded. After an intravenous injection of DEFINITY (perflutren lipid microspheres which are composed of octafluoropropane encapsulated in an outer lipid shell of (R)−hexadecanoic acid), the micro spheres were destroyed with high energy ultrasound of myocardial index of 1.4 given for a short period ("flashing"). The rate of micro bubble appearance within the LV wall was observed, to assess the myocardial perfusion. If perfusion defect was present, the pattern of perfusion defect was compared with coronary angiogram, for correlation of perfusion defects with significant stenosis of the epicardial coronary artery sub serving that area of. myocardium
Results: 27 patients were included in the study, The mean age of patients was 53.89 ± 16.4 years. There were 17 males (63%) and 10 females (37%). The mean NYHA class of breathlessness was 2.40 ± 2.2 and mean ejection fraction was 35 ± 15.02 %. There was significant agreement between the presence of myocardial perfusion defect on MCE and presence of obstructive coronary artery disease on angiogram (kappa value of $\kappa = 0.705$). The sensitivity, specificity, positive predictive value and negative predictive value of myocardial perfusion defect on MCE was 78.57%, 92.30%, 91.67%, 80% respectively. The power of study was 78.57%. The highest correlation of perfusion defect and poor coronary artery flow (< TIMI II flow) was seen in LAD territory ($\kappa = 0.779$), followed by LCX territory ($\kappa = 0.757$), and RCA territory ($\kappa = 0.514$).
Conclusions: Myocardial contrast echocardiogram is a safe, non invasive and cost effective method of evaluation of possible coronary disease in patients with acutely decompensated heart failure. MCE is highly specific to rule out coronary artery disease with a specificity of 92.3%. The perfusion defect correlated with angiographic poor flow (<TIMI II flow), with maximum correlation in LAD territory, followed by LCX territory and least in RCA territory.

Surrogate echocardiographic parameters for successful balloon mitral valvuloplasty

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Background: Even though many echocardiographic parameters have been proposed for assessing the severity of mitral stenosis and right ventricular dysfunction, scant data is available where in these parameters are tested as surrogates in the context of Balloon Mitral Valvuloplasty (BMV). The predictive value of many of these parameters in predicting success of BMV as against improvement in Mitral Valve Area (MVA) can be very useful.
Objectives: To find out the utility of surrogate echocardiographic parameters like mitral valve separation index (MVSI), left atrial volume (LAV), right ventricular systolic pressure (RVSP), tricuspid annular systolic excursion (TAPSE), tricuspid annular systolic velocity (S wave) and right ventricular Tei Index (TEI) in predicting success of BMV and their relation to MVA.
Methods: Prospective single center study involving 49 patients undergoing elective BMV. Echocardiographic measurements were taken before and 24 hours after BMV and statistical analysis was carried out.
Results: Mean age of the study population was 31 years (SD±9.55). BMV was successful in 38/49 patients. MVA increased from mean of 0.89 (±SD 0.16) to 1.53 (± SD 0.22) cm^2 ($p<0.01$), MVSI increased from 0.62 to 0.91mm ($p<0.01$), LA volume decreased from 64.5 to 56.2mm3 ($p<0.01$), RVSP decreased from 57.9 to 43.5 mm of Hg ($p < 0.01$), TAPSE increased from 22.2 to 26.3 mm ($p<0.01$), and S wave from 11.3 to 13.6 cm/sec ($p < 0.01$), and TEI decreased from 0.27 to 0.23 ($p<. 01$). RVSP and MVSP showed strong correlation with improved MVA. Area under Receiver Operating Characteristic (ROC) curve analysis showed percentage RVSP reduction to be best predictive of MVA followed by change in MVSI.
Conclusions: All surrogate markers showed favorable improvement following BMV with RVSP reduction and MVSI showing maximum predictability for change in MVA. The other right ventricular function indices and LA Volume poorly predicted MVA improvement.

Association between epicardial adipose tissue and waist hip ratio in patients with multi vessel coronary artery disease in Indian scenario

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Introduction: In the era when metabolic syndrome and obesity are growing in population, interest in visceral fat accumulation like Epicardial Adipose Tissue (EAT) as a marker of Cardiovascular risk seems more appropriate. EAT is a visceral fat depot of the heart located along the large coronary arteries on the surface of the ventricle and apex. In TTE, EAT was defined as an echo free space

between the outer wall of the myocardium and the visceral layer of pericardium. EAT was an independent risk factor for CAD like other traditional risk factors.

Aim: To identify the association between waist hip ratio and Epicardial adipose tissue in patients with multivessel coronary artery disease.

Methodology: 50 consecutive patients with multi vessel CAD detected by Coronary angiography were the subjects of the study. The study was done in the department of Cardiology in tertiary care hospital setting from April 2013 to July 2013. Patients with Acute Coronary syndrome and age <40yrs were excluded from the study. 25 normal persons were included as controls .In all these patients Waist Hip Ratio was measured. Waist circumference was measured midway between lowest palpable rib in mid axillary line and iliac crest (at the level of umbilicus). Hip Circumference was measured at the maximum width of buttocks. EAT was measured using Trans Thoracic Echocardiography in Parasternal Long Axis view anterior to the right ventricle in end diastole. The relation between EAT, Waist Hip Ratio with multivessel CAD were evaluated as well. Serum lipid levels was also analysed for any correlation with EAT.

Results: The mean EAT thickness in the study group was 7mm (Range 5 to 9mm). Control Group was 3mm(Range 2 to 4mm). There was no linear correlation between WHR and EAT.

Conclusion: EAT thickness has an independent predictive value for severity of Coronary artery disease. There is no linear correlation between waist hip ratio and epicardial pad of fat. Echocardiography is a simple non invasive tool for clinicians in assessing the EAT.

RVOT pacing versus RV apical pacing: Echocardiographic assessment of LV function

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Background: Long term pacing from RV apex is expected to adversely affect the LV function. Alternate site pacing, especially from the posterior wall of RVOT has been proposed as the closest mimic to physiological depolarization. Therefore myocardial disarray associated with apical pacing may not occur with RVOT pacing. However, there are not enough clinical reports to substantiate such benefits.

Aim: To objectively assess for any advantage in LV function with RVOT pacing over RV apical pacing.

Material and methods: From September 2007 to May 2012, sixty four patients underwent RVOT pacing in our institution. For this study we selected patients who fulfilled the inclusion criteria: completed more than one year of single chamber pacing with the lead tip in RVOT, 80-100% pacing frequency as observed in the follow up clinic, absence of myocardial infarction/ coronary revascularization, significant valve or myocardial disease, freedom from significant co morbid renal, pulmonary or hepatic diseases. Twenty patients, sixteen males and four females in the age group of 48 to 67 years fulfilled the above criteria. Pacemakers were implanted for symptomatic sick sinus syndrome or idiopathic complete AV block. We selected an age and sex matched control of twenty patients with RV apical pacing who fulfilled the inclusion criteria. Apart from routine clinical history and examination, QRS duration in surface ECG was measured and transthoracic echocardiography was done. Measurements of left atrium and LV internal dimensions and fractional shortening were taken in the long axis parasternal view. The average values of LV ejection fraction as calculated in the M mode and by Simpson's method were noted.

Result: QRS duration with RVOT pacing was significantly lower than RVA pacing. LV dilatation was also less with RVOT pacing as shown by lower values of LV internal dimensions. The other parameters did not differ significantly.

Conclusion: In this small study of twenty patients with follow up period of one to five years, there was less LV dilatation with RVOT pacing. Observations in a larger group with longer follow up and pre pacing echocardiography data will substantiate the superiority of RVOT pacing.

Relationship between swirling pattern of spontaneous echo contrast and LA thrombus in patient with mitral stenosis

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Background: Spontaneous echo contrast (SEC) is the presence of dynamic, smoke-like echoes seen while performing Trans Esophageal Echo (TEE), frequently in patients with mitral stenosis. Left atrial (LA) spontaneous echo contrast was diagnosed by the presence of dynamic smoke like echoes in the LA cavity and LA appendage (LAA) with swirling motion distinct from white noise artefact after adjusting the gain setting properly. Swirling pattern may be either clockwise or anticlockwise in nature.

Aim and objectives: The aim of the study is to determine the relationship between Swirling pattern of Spontaneous Echo Contrast in severe Mitral Stenosis and LA/LAA clot formation.

Methodology: This observational study was conducted using TEE in the department of cardiology in a tertiary care setting from October 2012 to July 2013. Every patient with severe mitral stenosis presenting for PTMC was evaluated before procedure for swirling pattern in spontaneous echo-contrast, rhythm and LA/LAA thrombus on TEE. Data were analyzed to determine the relationship between Swirling pattern of SEC in Mitral Stenosis and LA/LAA clot formation.

Results: A total of 60 patients with severe mitral stenosis were studied. Out of which, 46pts (77%) of patient had Spontaneous echo contrast. The patients with Spontaneous Echo contrast were

Table 1

Parameter	RVOT Pacing Mean (SD)	RV Apical Pacing Mean (SD)	P value * significant < 0.05
QRS duration in ECG	132 ms (20.73)	160 ms (22.11)	**0.000319***
Left Atrial size	3.58 cm (0.44)	3.815 ms (0.50)	0.128765
LV ID in diastole	4.37 cm (0.63)	4.80 cm (0.62)	**0.035356***
LV ID in systole	3.02 cm (0.65)	3.43 cm (0.57)	**0.037882***
Ejection Fraction	60.1 % (10.2)	55.0% (9.13)	0.109196
Fractional Shortening	32.0 % (7.73)	28.8 % (6.03)	0.15577

studied in detail. Mean age of these patients was 33yr (24-46yr). Of which 36 (78%) patients were females and 10(22%) were males. Out of 46patients, 38 patients (83%) had anticlockwise swirling pattern of SEC and remaining 8 patients (17%) had clockwise swirling pattern.. Out of 46 patients, LA/LAA clot were seen in 14 patients (30%), all them had anticlockwise pattern. LA/LAA clot was not seen in patients having clockwise swirling pattern. 38 patients (83%) were in sinus rhythm and 8 patients (17%) were in Atrial Fibrillation. In patients with Atrial Fibrillation, only Anticlockwise Swirling pattern of SEC were noted and all had LA/LAA clot. Mean LAA emptying velocity in all these patients was 0.20 m/s (range 0.1 - 0.48) and is more severe in anticlockwise swirling pattern.

Conclusion: Left atrial hemodynamics and its relationship with auto contrast is not fully studied. Our observation is that LA/LAA clot formation is less likely if there is clockwise movement. Exact mechanism of such phenomenon is to be explored further.

Prevalence of right atrial thrombosis in atrial fibrillation

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Introduction: This study was undertaken to look into the prevalence of right atrial (RA) chamber thrombosis in patients having atrial fibrillation (AF)

Methods: 72 patients having atrial fibrillation for various etiology were included in the study. Those patients who were already on anticoagulant were excluded from the study. Transthoracic and Trans-esophageal echocardiography were done to assess Right atrial thrombi and spontaneous echo contrast. Chambers such as right, left atrium and ventricles and appendages were measured. 30 patients with sinus rhythm were taken as controls.

Results: Patients with atrial fibrillation had larger right atrial dimensions (mean RA minor axis in AF patients was 5.2 cm compared to mean RA minor axis 3.8cm in controls) and lower TAPSE (Tricuspid annulus planar systolic excursion) (mean TAPSE in AF group was 13mm compared to mean TAPSE of 19mm in controls) compared with those patients in sinus rhythm($p<0.01$). 10 patients had thrombus in right atrium and 23 had thrombus in left atrium. Spontaneous echo contrast was noted in 26 patients in right atrium and 42 patients in left atrium. No patients with sinus rhythm had evidence of thrombus in either atria. Patients with right atrial thrombus had larger right atrial dimensions ($p < 0.01$). Spontaneous echo contrast was detected in all patients with thrombi.

Conclusion: In patients with atrial fibrillation right atrial chambers are also equally important in terms of thrombus formation. Although no incidence of pulmonary embolism were noted in our study it is prudent to assess right atrium in atrial fibrillation patients for its prevention.

Right ventricular systolic function assessment by tissue-Doppler echocardiography in acute pulmonary thromboembolism

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Background: Assessment of the right ventricular (RV) function by echocardiography in patients with pulmonary thromboembolism (PTE) is complex and frequently qualitative. Tissue Doppler has been used for the semiquantitative assessment of this chamber, although with some limitations.

Aim and objectives: To evaluate RV function in acute PTE using various echocardiographic parameters

Material and methods: Patients admitted with PTE during July 2012 to June 2013 in our institute were studied using conventional and tissue-Doppler echocardiography within 24 hours after diagnosis. Fractional area change (FAC), RV free wall thickness, TAPSE, myocardial velocities (s') at annulus and RV myocardial performance index (MPI) were obtained and RV dysfunction was diagnosed.

Results: During abovementioned period 30 patients [18 (60%) men and 12 (40%)women] were admitted in our institute. Average age of the study population was 55 ± 17 years. PTE was found to be massive in 8 (26.67%), submassive in 13 (43.34%) and mild in 9 (26%). Of these RV dysfunction was found in 21 (70%) patients {massive PTE 8(100%), submassive PTE 10 (76.92%), mild PTE 3 (33.34%)} when all the parameters are considered, but with TAPSE RV dysfunction found in16 (53.34%) patients {massive PTE 8 (100%), submassive PTE 7(53.84%) and mild PTE 1(11.11%), with RV thickness RV dysfunction was found in 20(66.67%)patients {massive PTE 8(100%), submassive PTE9 (69.23%) and mild PTE 3(44.43%)} with myocardial velocity Rv dysfunction was found in 18 (60%) patients {massive PTE 8 (100%), submassive PTE 8(61.53%) and mild PTE 2 (22.21%)} and with myocardial performance index RV dysfunction was found in 17 (56.67%)patients{massive PTE 8 (100%), submassive PTE8 (61.53%) and mild PTE 1 (11.11)}. The cut-off point of TAPSE for RV dysfunction was <1.5cm, for RV thickness <0.5cm, for myocardial velocity <10.5cm/s and for MPI >0.32 was taken.

Conclusions: In PTE, RV dysfunction better detected with tissue Doppler techniques in addition to 2D and M mode echocardiography.

Left Atrial Thrombus in a neonate with normal heart after sustained supraventricular tachycardia

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Left Atrial Thrombus is uncommon in neonates. We present a neonate who had Paroxysmal Supraventricular Tachycardia (PSVT), whose echocardiography revealed a large Left Atrial Thrombus which resolved later with treatment. Supra Ventricular Tachycardia (SVT) is not an uncommon event in infants with an incidence of 1:2500.

Case report: A 28 day-old female neonate preterm, appropriate for gestational age with a birth weight of 1.9 kg reported to our hospital with a history of difficulty in breast feeding, excessive cry, increased precordial activity and increased rate of breathing. On examination the baby was Tachypneic with heart rate of 270/min. Electrocardiogram (EKG) revealed Narrow QRS Regular Tachycardia with a heart rate of 270/min. SVT was terminated with adenosine bolus. EKG after termination of tachycardia showed Sinus Rhythm with delta wave with short PR. Echocardiography revealed a large mobile hyperechoic mass (9 mm $\times$ 6 mm) from Left Atrial Appendage (LAA) extending to body of left atrium with

same hypoechoic areas inside which was typical of a thrombus rather than a tumor. Ventricular function was normal, Atrial function couldn't be assessed. Blood Coagulation parameters revealed Low Protein C Levels (46.7%) and Protein S antigen of 64.2%. Baby was initiated on Enoxaparin 1.5 mg/kg beta-blockers and aspirin.

There were no further episodes of SVT and serial echocardiography revealed resolving thrombus. Patient was started on Warfarin at 0.5mg/kg. Follow up echocardiography was done at 3rd month and 6th month. Repeat ECHO at 6th month revealed complete resolution of the thrombus. After 8 months repeat Protein C antigen was normal (102.4%) and Protein S antigen (97.3%). Beta blockers are stopped as repeat EKG after 6 months showed no Delta waves.

In conclusion this rare case presented with a silent Left Atrial thrombus after sustained SVT in a neonate with WPW syndrome. The rarity of the case is LA Thrombus in an early Infant with Structurally Normal Heart after an Episode of SVT Is Rare, with complete resolution after 6 months and doubtful contribution of Protein C levels.

Prediction of left main and triple vessel disease in coronary artery disease patients with no regional wall motion abnormality using resting longitudinal tissue Doppler strain

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Background: A stress test is usually required for non invasive echocardiographic detection of coronary artery disease, even in left main or severe triple vessel disease, as regional wall motion abnormalities are not always present at rest. Doppler derived strain can be used to analyze the longitudinal component of strain as longitudinal mechanics predominate in the ischemia – vulnerable subendocardium. In appropriate patients at rest, subclinical left ventricular dysfunction has been shown to correlate with the presence of obstructive coronary artery disease.
Aims and objective of the study: Whether resting peak systolic longitudinal strain (PSLS) of left ventricle using tissue Doppler method might be useful for screening of left main or severe triple vessel disease in patients with normal ejection fraction and no regional wall motion abnormality.
Material and method: Fifty patients with suspected CAD (stable ischemic heart disease, unstable angina and non ST elevation myocardial infarction or atypical chest pain) who underwent both, echocardiography (Vivid 7 dimension, GE healthcare) and coronary angiography, were studied. Patients were grouped according to the coronary angiographic findings as follows; high risk group having left main or triple vessel disease ($n = 18$), low risk group with single or double vessel disease ($n = 20$), and control group without significant CAD ($n = 10$). PSLS were obtained successfully in all the segment of the left ventricle in 48 (96%) patients. There was no resting wall motion abnormality in any of the patient. The value of PSLS was significantly low in the high risk group ($p < 0.05$) especially in the mid and the basal LV segments.
Conclusion: PSLS at rest was significantly lower in patients with left main or triple vessel disease CAD patients without regional wall motion abnormality. This finding might be useful for identification of patients having severe CAD before they undergo coronary angiography.
Note: The study is ongoing with a target of achieving a total of 100 patients. Full data will be presented at the CSI 2013 if the abstract is accepted.

Electrophysiology

A study on ventricular arrhythmias complicating acute myocardial infarction

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Background: Ventricular arrhythmias occur in about 25% of acute myocardial infarctions (MIs). They are associated with increased in-hospital mortality.
Aim: The aim of this study is to identify predictors of ventricular arrhythmias after acute MI and to determine whether successful revascularization will reduce in-hospital mortality.
Methods: Retrospective study of all patients who underwent fibrinolysis for acute MI in tertiary care hospital settings between September 2011- December 2012.
Results: Of the 465 patients who were treated with fibrinolysis for acute MI, 23 (4.9%) developed sustained ventricular tachycardia (VT) or ventricular fibrillation (VF) before revascularization. After multivariable adjustment, independent predictors of sustained VT/VF included cardiogenic shock ($P < .001$), heart failure ($P < .001$), chronic kidney disease ($P = .009$), and presentation within 6 hours of symptom onset ($P = .001$). Patients with sustained VT/VF had greater in-hospital mortality (21% vs 4.2%, $P < .001$). Although successful fibrinolysis was associated with decreased in-hospital mortality in patients with VT/VF ($P < .001$), patients with sustained VT/VF and successful revascularization experienced increased mortality compared with patients without sustained ventricular arrhythmias ($P < .001$).
Conclusion: Among patients undergoing fibrinolysis for acute MI, sustained VT/VF remains a significant complication associated with a 4-fold increased risk of in-hospital mortality. Early mortality is reduced after successful fibrinolysis, but remains elevated in this high-risk group.

Hemiazygous continuation of interrupted inferior vena cava draining into coronary sinus via LSVC in association with symptomatic complete heart block

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Background: Femoral or subclavian approach is preferred for temporary pacemaker insertion. Rarely anatomical variations make this procedure difficult. Anomalous continuation of IVC as azygous or hemiazygous is rare but well described in literature.
Aims and objectives: Our aim to report a case of Anomalous continuation of IVC as azygous or hemiazygous which is rare and

knowledge of this Anomaly may be beneficial for the patients during an emergency.

Case report: A 60 year-old lady was admitted with the complaint of multiple syncopal attacks during last 24 hrs. Her ECG showed CHB with escape junctional rhythm with intermittent *Torsades de pointes*. She was taken up for temporary pacemaker insertion as an emergency under fluoroscopy. The pacemaker lead took an abnormal route to left side of cardiac silhouette. IVC angiogram confirmed hemiazygous continuation of interrupted inferior vena cava draining into coronary sinus via LSVC (fig:1). Injection through left ante-cubital vain to see the venous drainage left subclavian vein was also draining into LSVC. Temporary pacemaker implantation was done through right subclavian vein which was found to be normal course and draining to right atrium. Subsequently Permanent pacemaker was done through epicardial approach.

Fig. 1 – hemiazygous continuation of interrupted IVC draining into coronary sinus via LSVC.

Conclusion: In conclusion we report a rare anomaly of the venous system in association with symptomatic CHB and the associated technical difficulties. Knowledge of this anomaly may be beneficial during an emergency.

Is right ventricular outflow septal pacing superior to the right ventricular apical septal pacing with regard to long term left ventricular function and mechanical synchrony?

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Background: Over 5 decades have transpired since the advent of permanent pacing. Until now RV apex has been the choice of endocardial lead placement site due to the well understood anatomy, ease of lead placement and long term safety and stability. In the last decade, there were numerous studies and clinical reports suggestive of long term electrical and mechanical dyssynchrony and hence worsening of global LV function with RV apical (RVA) pacing. Right ventricular (RVOT) septal lead placement has been considered as a better and safer alternative due to its proximity to the normal conduction system and a relatively narrow QRS complex compared to the RVA pacing. Few studies have shown encouraging results with RVOT septal pacing with regard to acute and short term (up to 4 years) LV synchrony and overall LV function. We tried to study the long term effects of RVOT septal versus RVA pacing on LV structure, function and mechanical synchrony.

Methods: Age and gender matched 48 patients (RV apical pacing =27 and RVOT septal pacing= 21) who were on permanent cardiac pacing (DDD, VDD or VVI) for more than 1 year were enrolled in the study. All these patients had structurally normal heart and normal LV systolic functions at the time of pacemaker implantation. Baseline echocardiographic parameters were obtained from the old records. All these patients underwent detailed echocardiographic assessment including dyssynchrony analysis (pulse tissue doppler, tissue velocity imaging and speckle tracking strain imaging). The above mentioned parameters were compared between the two groups

Results: The average duration of pacing was 6.33±3.2 yrs in RV apical paced group and 3.95±2.43 yrs in RVOT septal paced group. The RV apical pacing group had significantly wider QRS duration compared to RVOT septal pacing group (152.96 ms v/s 142.38 ms). Pulse tissue doppler, tissue velocity imaging (using time delay in onset of systole from QRS onset in opposite LV walls) and speckle tracking systolic radial strain analysis revealed better Intraventricular LV synchrony in the RVOT paced group compared to RVA paced group ($p<0.05$). The most consistent pattern of LV dyssynchrony was seen between septum and lateral walls. The higher ventricular dyssynchrony noted in the RVA paced group was not related to the longer duration of pacing. There was a trend of better inter-ventricular synchrony in the RVOT paced group compared to RVA paced group ($p=0.07$). There was no significant variation in atrio-ventricular dyssynchrony ($p=0.71$) between the RVA and RVOT paced group. The LA dimension and MR (≥grade II) were significantly higher in RVA paced group compared to RVOT septal pacing group ($p<0.04$). The ventricular dyssynchrony observed in the RVA paced group did not lead to significant negative effects on LV dimensions, LVEF and cardiac index.

Conclusion: Our analysis has shown that long term permanent cardiac pacing is associated with long term cardiac mechanical dyssynchrony. In our study, RVOT septal pacing was associated with better echocardiographic indices of inter and intraventricular mechanical synchrony compared to the RV apical pacing group. RVOT septal pacing was also found to be associated with better parameters of LA remodelling and MR. Hence, RVOT septum may be the preferred site over RV apical pacing in maintaining better cardiac synchrony, till other better options are available.

Radiofrequency ablation of scar VT in ischemic heart disease: Tertiary center experience

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Introduction: Ventricular tachycardia (VT) is an important cause of morbidity and mortality in patients with ischemic heart disease. Implantable cardioverter defibrillators (ICD) prevent sudden death but recurrent VT occurs in 40-60% of patients and is associated with increased mortality.
Objective: We report the medium term outcomes of ischemic scar VT ablation using 3D mapping.
Methods and results: 10 patients with previous MI and VT underwent radiofrequency ablation (RFA). Mean Age was 48+-10 yrs and nine patients were male. Four patients had old anterior wall MI (AWMI) and six had inferior wall MI (IWMI). 3 patients had a previously implanted ICD. CARTO was used in nine patients and Ensite NavX in one. The mean procedure duration was 216 +- 79 min and mean fluoroscopy time was 33+- 20 min. The mean EF was 36 +- 6 %. . More than one morphology VT was induced in three patients. Arrhythmia targeted strategy with activation and entrainment mapping was used in four patients and a substrate targeted strategy was used in six patients (electively in two, hemodynamically unstable VT in three and difficult induction in one). Mean of 32 +- 17 ablations with a duration of 1651 +- 804 seconds were delivered. Immediate procedural success with no inducible sustained VT was seen in 8 patients (80%). Two patients had one VT inducible at end of procedure, but have not had recurrence over two years. Among the other eight patients, follow up information ranging from 1-28 months was available in 6. One patient had recurrent VT and underwent a second procedure that was successful with no further events.
Conclusions: Radiofrequency ablation with the use of electroanatomic mapping is associated with a reasonable acute and medium term success rate in patients with previous MI and scar related VT.

Electroanatomical mapping and ablation (3D EAM) in idiopathic ventricular tachycardia: Immediate and long-term outcomes

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Background: Catheter ablation is the treatment of choice in ventricular tachycardia with a structurally normal heart. However, Catheter ablation is often challenging as it requires a hemodynamically stable patient during tachycardia induction and mapping.
Objectives: To study the immediate and long term outcome of patients undergoing 3 Dimensional Electro anatomical Mapping (3D EAM) for ventricular tachycardia in patients with a structurally normal heart.
Methods: We retrospectively analyzed clinical and procedural data of all patients with ventricular tachycardia and structurally normal heart, who underwent 3 Dimensional Electro anatomical Mapping and Ablation (3D EAM) at our centre using the CARTO system
Results: Between December 2007 and May 2013, 54 patients underwent electroanatomical mapping for idiopathic ventricular tachycardia. The mean age was 37.5 ± 15.9 years. 37/54(68.51%) were males and 17(31.49%)were females. 35 patients (64.8%) presented with palpitations, 21(38.8%) had syncope, while 7 (12.9)% presented with resuscitated cardiac arrest. The distribution of the tachycardia foci were as follows: LV free wall in 26 (48.18%) patients, Right ventricular outflow tract (RVOT) in 22 (40.71%) patients, LVOT in 2 (3.7%)patients (right aortic cusp origin in both) and Fascicular VT in 4 (7.41%) patients. The procedure was successful in all cases. There were no peri-procedural complications in any of the cases. The mean fluoroscopy time was 32.32 ± 20.03 minutes. Fluoroscopy times were lower for LVOT and RVOT VT (18 ± 11.3 minutes and 22.56 ± 14.90 minutes respectively) when compared to LV free wall and fascicular tachycardia (41.61 ± 21.21 minutes and 32.75 ± 12.52 minutes respectively). After a mean follow up of 3.4 years, recurrences were noted in 3/54(5.54%) patients (2 patients with VT originating from LV free wall and one patient with RVOT VT). All recurrences occurred within the first 2 years of procedure.
Results: 3D Mapping offers accurate localization of the tachycardia focus and results in high success rates with good long term results and is safe.

Bailout transcatheter device closure of inadvertent ascending aorta perforation during percutaneous transvenous mitral commissurotomy

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A 12 year old girl presented with history of 2months of shortness of breath and regular rapid palpitations, with no apparent history of joint pains in the past. Patient was clinically diagnosed as a patient of chronic rheumatic heart disease, severe mitral stenosis with severe pulmonary artery hypertension and associated tricuspid valve regurgitation. ECG revealed sinus tachcardia with left atrial enlargement and right ventricular hypertrophy. Chest X-ray revealed cardiothoraccic ratio of 65%, with evidence of left heart border straightening with Right atrial enlargement and evidence of pulmonary venous hypertension. Transthoraccic 2D echocardiography revealed pliable noncalcific severe mitral valve stenosis (area of 0.9 sq.cm), with fusion of both commissures and mild mitral regurgitation. Interatrial septum was bulging towards the Right atrium. Wilkinson score was 9/16.There was severe tricuspid valve regurgitation with right ventricular systolic pressure of 80 mm hg and evidence of right ventricular dysfunction. Aortic valve was normal with no evidence of intracardiac clot. Patient was taken for elective percutaneous transvenous mitral commissurotomy (PTMC) with right femoral venous and arterial access. As usual after positioning the pigtail catheter at aortic root the Brocken borough needle was introduced through the 10 Fr Mullins sheath which was placed in SVC and the system withdrawn for attempted interatrial septum puncture. There was an evident interatrial septal bulge and the site of puncture was ascertained in both anteroposterior (AP) and left lateral projections before puncturing in left lateral view. However, inadvertently the aortic noncoronary cusp was pierced through the anteriorly punctured interatrial septum in to LA in to the aorta. It was confirmed by the aortic tracing from the mullins sheath as well as the aortic root angiograms performed through the pigtail catheter in Left anterior oblique, Right anterior oblique and antero-posterior projection. Immediate 2D echo revealed same findings with no associated pericardial effusion. Although the patient was hemodynamically stable it was decided to seal the defect because of the relatively large puncture through the 10 Fr

sheath. Ascending aortogram with the mullins sheath in situ revealed no leak across the defect and normal coronary origin. Hence, a Cocoon duct occluder size 4/6 with aortic retention diameter of 10 mm was planned to be deployed. Through a 6 Fr sheath the device was loaded in to the same mullins sheath from the right femoral vein after removal of the dilator and deployed across the aortic perforation. Deployment was done after confirming appropriate position by both aortic and right ventricular angiograms in various projections. There was no residual leak or aortic regurgitation after deployment of device as demonstrated by aortogram and echocardiography. The PTMC then was reattempted successfully with due care about the correct site of interatrial puncture. The postprocedure echocardiography revealed mitral valve area of 1.7 sq.cm with mild mitral regurgitation and Right ventricular systolic pressure of 45 mm hg and no pericardial effusion. The device across the noncoronary cusp was insitu with no residual shunt and no aortic regurgitation. Patient was discharged after 72 hours of observation with stable hemodynamic parameters.

Conclusion: PTMC is probably the most common transcatheter valvular intervention in India. It is however imperative to assess the proper site of interatrial septal puncture by various projections and by echocardiography especially when there is septal bulge in to right atrium during PTMC. By timely assessment and ingenuity device occlusion can be performed in similar cases safely to avert a major emergency surgical procedure.

Pharmacology

Evaluation of relative efficacy and safety of prasugrel and clopidogrel in medically managed high risk unstable angina / non STEMI ACS population

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Background: Compared to standard dosage of clopidogrel, the therapy with prasugrel, a potent thienopyridine P2Y (12) receptor antagonist, have been found to be more effective in reducing the ischemic complications in ACS patients undergoing percutaneous coronary intervention (PCI). Similarly, the efficacy and safety of these two antiplatelet agents, needs to be worked up, in high risk ACS patients who are medically managed without any PCI.

Objective: This study was carried out to evaluate the relative efficacy and safety of prasugrel and clopidogrel in medically managed high risk Unstable Angina (UA) / Non-ST Elevation Myocardial Infarction (NSTEMI), ACS population.

Material and methods: This study was carried out in 100 consecutive patients of high risk UA / NSTEMI admitted to ICCU at Pt. B.D. Sharma PGIMS, Rohtak. It was an open label prospective randomized trial, where a total of 100 consecutive patients of high risk UA / NSTEMI were studied for a period of 30 days. These patients were randomly assigned to prasugrel (40 mg as loading dose followed by 10 mg/day as maintenance dose, n=50) and clopidogrel (300 mg as loading dose followed by 75mg/day as maintenance dose, n=50)

Major adverse cardiac events (MACE) were observed during hospital stay (0-5 days) and up to a period of 30 days after discharge from the hospital in both the groups. Both the groups were compared for a composite outcome of death, major/minor bleeding episodes, arrhythmia, left ventricular failure (LVF), recurrent angina, stroke and ischemia with ECG changes.

Results: No patient was withdrawn from the study because of side effects. Both the groups had 1 death each. LVF occurred in 1 patient in group-A and 3 patients in group-B (p=non significant). Incidence of recurrent angina was significantly lower in prasugrel group (4% vs 16%, $p < 0.005$). 4% of patients in prasugrel group had progressive ECG changes because of ischemia, compared to 12% in clopidogrel (p=Non-significant). When the total number of MACE are compared, they were significantly lower in prasugrel group [8 (16%) Vs 19 (38%), $p < 0.005$] compared to clopidogrel group. When the results were compared between a subgroup of diabetes patients in the study population (n=5 in prasugrel group versus n=6 in clopidogrel group), total MACE were lower in prasugrel group than clopidogrel group (2 Vs. 7) although p value was non-significant.

In diabetic subgroup, one patient had LVF (16.7%, n=6) and two patients had recurrent angina (33.3%, n=6) in clopidogrel group while no LVF or recurrent angina was observed in prasugrel group.

Conclusion: In this analysis from our study, we have demonstrated that in comparison to the standard clopidogrel therapy, prasugrel resulted in greater benefit in reducing ischemic events and improving the net outcome of ACS (high grade UA/NSTEMI) population. Prasugrel was specially more effective in high risk ACS population with diabetes mellitus.

Cardiovascular Pharmacology

To assess evidence practice gaps amongst patients undergoing CABG and PCI in terms of medication prescription advice at discharge

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Background: Despite successful coronary revascularization guideline directed medical therapy (GDMT) should be routinely recommended after coronary artery bypass graft (CABG) as well as percutaneous coronary intervention (PCI). Adherence to GDMT at hospital discharge is often sub-optimal and data pertaining to this are lacking from our country.

Aims and objectives: A retrospective analysis to assess if prescription of GDMT at hospital discharge was any different between patients following CABG and PCI.

Methods: The institutional hospital database and patient records of last 18 months (n = 1250, PCI, n=1012,81% and CABG, n = 238,19%) were assessed and prescription rates of various drugs including dosages at discharge were analyzed.

Results: Patients with CABG group were more likely to be diabetic (48% vs 33%, $p< 0.01$) and hypertensive (63.4% vs 45.4% $p<0.001$, while history of smoking, family history of CAD and mean lipid values were comparable amongst the two groups. Patients in CABG group more frequently had stable angina (65% vs. 32%, p=0.01, while Acute Coronary Syndrome was more frequent in those undergoing PCI (68% vs. 35%, p=0.01).

Drug prescription rates at discharge: There was no significant differences in rate of prescription between PCI and CABG groups for dual anti-platelet therapy (aspirin 100% in both, clopidogrel 100% vs 98%), beta blockers (98% vs 95%) and statins (100% vs. 99%). In contrast, ACEI and Nitrates were more frequently prescribed post-PCI vs. CABG (97.9% vs. 62.3%, $p<0.001$ for ACEI; 61.3% vs. 2.6%, $p<0.001$ for nitrates respectively). Interestingly, despite similar mean baseline LVEF, diuretics were prescribed more frequently after CABG (95% vs.7%, $p<0.001$). Prasugrel and Ticagrelor were only prescribed in post PCI patients.

Doses of drug used: Aspirin (75 mg OD, 150mg OD, 300 mg OD) was prescribed equally commonly in both groups, with 150 mg OD being the most common dose (89.7 vs 98.3%). Clopidogrel 75 mg BD was the most commonly used dose post PCI (68% vs 0%), while post CABG it was only prescribed as 75 mg OD. Patients undergoing PCI were much more likely to receive higher statin dose (36.8 vs 13.5 mg, $p< 0.001$). Prescription rates for 40-80 mg statin was 76%vs0% while that for 10 mg was 3%vs79% for PCI and CABG respectively ($p<0.001$). Prescription of beta blockers (50mg) was more common post PCI (85% vs 58%) while 25 mg was more frequently prescribed post CABG (33%vs10%, all $p< 0.01$).

Conclusions: Significant differences in adherence to GDMT at hospital discharge exist even in a tertiary care centre. Patients were less likely to receive high dose statin or higher doses of beta blockers and more likely to receive diuretics (irrespective of baseline EF) following CABG. Following CABG, 5% of patients were not prescribed beta blockers and 1/3rd did not receive ACEI at discharge. Such evidence practice gaps need to be rectified to further improve quality of cardiac care in CAD patients following revascularization.

Valvular Heart Disease

Echocardiographic follow-up study of immediate and long term outcomes of balloon mitral valvotomy for rheumatic mitral stenosis

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Background: Rheumatic heart disease (RHD) is a major public health problem in India and mitral stenosis is the most frequent form of valvular affliction in RHD with significant morbidity & mortality. Balloon mitral Valvotomy (BMV) is a safe and effective therapeutic modality for managing such patients.

Aims and objectives: To retrospectively analyse the immediate and long term outcome after BMV performed at a tertiary centre.

Methods: Case records of 2330 patients who underwent BMV form June 1999 to December 2005 were analysed.

Results: Mean patient age was 33 ± 11 yrs (range 8 to 80), 58.5% were females and 15.2% (n=355) were in atrial fibrillation (AF) at the time of the procedure. Most patients included in the analysis had undergone BMV for the first time, while 1.8% (n=43) were post BMV restenosis and 2.7% (n=63) were restenosis following closed mitral valvotomy (CMV).

The procedure was successful in 92.7% of patients as defined by achieving mitral valve area ≥ 1.5 cm2 or more with no more than grade 2 Mitral regurgitation (MR). Among procedural complications, 5.3% (n=123) developed new MR, 4.5% (n=104) developed worsening of pre-existing MR, 0.5% (n=12) developed tamponade and 7.0% (n=162) had residual ASD. Overall, 0.5% (n=12) died, 0.7% (n=16) underwent in-hospital Mitral valve replacement (MVR), 1 patient sustained ischemic Cerebrovascular accident (CVA) due to embolism while 0.2% (n=5) patients developed peripheral embolism.

After a successful BMV, survival free of restenosis, re-do BMV, MVR and death was 97.9%, 86.8%, 60.0% and 45.4% at 1 yr, 5 yr, 10 yr and 13 yr respectively.

Patients with Normal sinus rhythm (NSR) and those who achieved valve area > 1.7 cm^2 had significantly better survival as compared to patients with AF (NSR-10.9 yrs, 95% CI 10.6-11.2 vs AF-9.1yrs, 95% CI 8.5 − 9.7, p = <0.001) and those who achieved valve area between 1.5- 1.7 cm^2 (MVA>1.7- 11.36, 95% CI 11.07-11.66 vs MVA 1.5-1.7 − 10.09, 95% CI 9.74-10.45, p = <0.001).

Patients with AF demonstrated 96.3%, 79.7%, 46.2% and 31.2% event free survival rates at 1yr, 5 yr, 10 yr and 13 yrs of follow-up respectively whereas the corresponding event free survival rates in patients with NSR were 98.2%, 88.1%, 62.3% and 48.3 % respectively.

Patients who achieved valve area 1.5-1.7 cm^2 showed 99%, 83.8%, 53.4% and 33.5% event-free survival at 1 yr, 5 yr, 10 yr and 13 yrs of follow-up respectively whereas those with valve area ≥ 1.7 cm^2 showed survival rates of 98.2%, 95.4%, 73.4% and 65.2 % at respective follow-ups.

Conclusion: After an initial successful BMV, long term survival from restenosis, MVR and death though excellent at 5 years (86.8%), is only modest (45.4%) at 13 years. Patients with sinus rhythm had better long term outcomes as compared those with AF (48.3% vs 31.3% at 13 years). Patients who achieved an immediate post BMV valve area ≥ 1.7 cm2 had the best long term outcomes.

Apixaban versus warfarin in patients with atrial fibrillation and valvular heart disease: Finding from the Aristotle study

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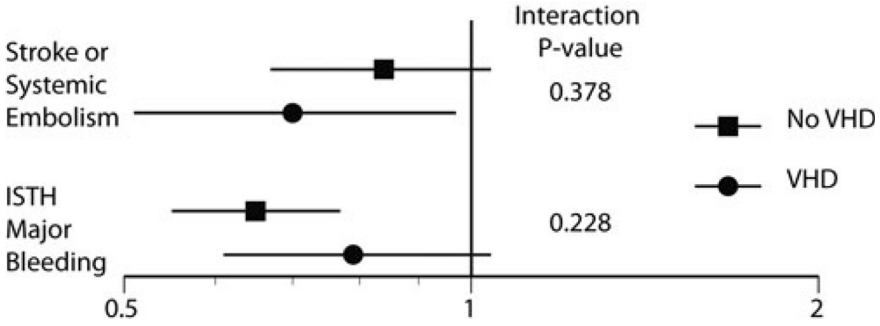
Aim: Apixaban is indicated for the prevention of stroke and systemic embolism (SE) in pts with nonvalvular AF. In this context, valvular refers only to clinically significant mitral stenosis (MS) and not other valvular heart disease (VHD). Little is known about the efficacy and safety of apixaban in pts with AF and VHD.

Methods: We used data from 18,197 pts with AF and ≥1 risk factor for stroke in ARISTOTLE with available information on VHD. Pts with clinically significant MS and mechanical heart valves were not eligible. Of these, 4808 (26.4%) had VHD defined by any history of at least moderate mitral regurgitation (3526), MS (131), aortic regurgitation (887), aortic stenosis (384), tricuspid regurgitation (2124), or valve surgery (251). We compared the effect of apixaban vs. warfarin on rates of stroke or SE and major bleeding in pts with and without VHD using Cox proportional hazards modeling.

Results: Pts with VHD were older, had more prior MI and prior bleeding, had a higher mean CHADS2 score, and had less hypertension and diabetes than pts without VHD. Pts with VHD had higher rates of stroke or SE and bleeding than pts without VHD. The benefits of apixaban compared with warfarin in reducing stroke and SE (interaction p=0.38), causing less major bleeding (interaction p=0.23), and decreasing death (interaction p=0.10) were consistent irrespective of the presence of VHD (Fig).

Conclusions: Pts with AF and VHD are at high risk for thromboembolic events and bleeding. Apixaban was similarly efficacious and safe in AF pts with and without VHD. Additional research is needed on the efficacy and safety of apixaban in pts with AF and VHD, particularly those with clinically significant MS and mechanical prosthetic valves.



Immediate and short term outcomes of balloon aortic valvuloplasty – Tertiary care experience

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Background: Balloon Aortic Valvuloplasty (BAV) has definitive role as safe palliative treatment in severe symptomatic aortic stenosis and as a bridge to definitive therapy. Renewed interest in this procedure is seen with significant advances in transcatheter aortic valve implantation. BAV relieve aortic stenosis by commissural splitting in congenital and rheumatic aortic stenosis, whereas in degenerative calcific aortic stenosis it do so by fracture of nodular calcium. This study analyse safety and effectiveness of BAV for severe aortic stenosis of various etiology and here we report single centre experience of 116 cases in 13 years.

Methods: This retrospective study included 116 patients of severe symptomatic aortic stenosis with mean gradient >50 mm Hg assessed by echocardiography. All patients of aortic stenosis of various etiology like congenital, rheumatic and degenerative calcific aortic stenosis was included in study from 1997 to June 2013. BAV was done as bridging to definitive therapy, as a palliative treatment for symptomatic relief and also as a part of multivalvular intervention in rheumatic aortic stenosis. All patients underwent BAV by retrograde approach. After crossing the stenotic aortic valve peak to peak transvalvular gradient was measured and left ventriculogram performed routinely to assess left ventricular function and aortic annulus size. Stepped balloon diameter was used in all cases for dilatation with rapid ventricular pacing. Post procedure 50% reduction in transvalvular peak to peak gradient was considered as successful result, < 50% reduction as partially successful and little or no reduction in gradient despite maximal balloon dilatation as unsuccessful result.

Results: Out of 116 Patients, 6 (5.2%) had failure to cross stenotic aortic valve and hence procedure abandoned. Of the patients who underwent BAV 56%(n= 65) were males and 44%(n=51) were females. 22.4%(n=26) were children under 18 years of age. Mean age was 28 years (range 1 year to 56 years). 32.7% (n=38) had Rheumatic heart disease with severe aortic stenosis in addition to mitral valve involvement. 45.6%(53) had congenital aortic stenosis with morphologically bicuspid aortic valve. One patient with subaortic membrane underwent successful procedure. 5%(n=6) had calcific degenerative aortic stenosis, remaining 15.5%(n=18) had severe aortic stenosis of uncertain etiology. Stepped balloon was utilized in all (90% cribier latec and 10% NuMed Tyshak). The mean fall in transvalvular peak to peak gradient was from 106.3±38 mm Hg to 32.04±19.94 mm Hg (P<0.0001). Procedure was successful in 84.8%, partially successful in 12.12% and unsuccessful in 3%. There was good immediate and short term result as evidenced by symptomatic relief and significant fall in transvalvular gradient. Overall, Aortic regurgitation occurred in 37.2%(n=41), Moderate aortic regurgitation in 18.1% (n=20),and severe aortic regurgitation in 4.2%(n=5). 2.5% had pericardial effusion (n=3). One patient had cardiac tamponade. 1(0.9%) patient died of left ventricular posterior wall perforation. Vascular complications occurred in 0.9%(n=1). Six month follow up available for 92 patients. Four patients with rheumatic aortic stenosis underwent DVR. Two patients with calcific AS underwent AVR. Increase in the mean gradient at 6 months was from 32.04±19.94 mm Hg to 45±24.4 mm Hg.

Conclusion: BAV in our series was done for Congenital, Rheumatic and Degenerative aortic stenosis with good immediate and short term results underscoring its efficacy and safety for palliative and bridging therapy in the treatment of severe symptomatic Aortic stenosis.

Prevalence of coronary artery disease in patients with rheumatic heart disease: Does RHD protect from cad??

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Background: RHD continues to be one of the major CV diseases in developing countries whereas CAD is the most common cause of CV mortality worldwide. However it is not well known how the

presence of RHD affects the prevalence of CAD in these patients. We wanted to analyse whether presence of RHD has any impact on prevalence of CAD.
Methods: We retrospectively analysed the data of all RHD patients (Group A) of 30 to 70 yrs age , without conventional modifiable coronary risk factors (RF) (like HTN, DM, smoking, dyslipidemia, obesity), not a known case of CAD, who underwent CAG in our institute from Jan 2012 to Dec 2012. During same period same age group patients without above said RFs or CAD or RHD (Group B) were also analysed. CAD was insignificant if luminal stenosis was <50% & significant if it was >50%.
Results: 53 RHD patients [16 (30.19%) males, 37 (69.81%) females with mean age 47.3±13.5 yrs.] and 370 CAD patients [214 (57.84%) males, 156 (42.16%) females with mean age 50.2±15.8 yrs.] who filled the inclusion criteria were analyzed. In Group A, 37 females, 36 (97.3%) had normal coronaries (NC) & 1 (2.7%) had insignificant CAD. None of them had significant CAD. Similarly out of 16 males, 15 (93.75%) had NC & 1 (6.25%) had significant CAD. In group B, 156 females, 86 (55.13%) had NC, 22 (14.1%) insignificant CAD & 48 (30.77%) had significant CAD. Out of 214 males, 38 (17.76%) had NC, 48 (22.43%) insignificant CAD & 128 (59.81%) had significant CAD. In the same age group , despite of difference in the gender, the chi square analysis showed significant association of the CAG finding (normal, insignificant and significant in decreasing order) and RHD (p=0.000). For classification of data in terms of severity of CAD and presence or absence of RHD, Spearman's rho correlation coefficient test showed negative correlation to the occurrence of RHD and CAD (Sperman's rho= -0.21 with P= 0.003). Means Group A (patients with RHD) had significantly higher incidence of normal coronaries and significantly lower incidence of significant CAD as compared to Group B of same age group despite more females were there in Group A.
Conclusions: RHD appears to protect from significant CAD in the absence of coronary RFs.

Prognostic significance of newly acquired bundle branch block after aortic valve replacement

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Background: The prognosis of bundle branch block (BBB) that occurs after aortic valve replacement was studied retrospectively
Aims & objectives: To determine the prognostic significance of postoperative bundle branch block after aortic valve replacement.
Method: 200 patients who had aortic valve replacement in our institution over the last 3years were studied. The effect of BBB on the combined end point of syncope, atrioventricular block and sudden cardiac death was studied during 3years of followup.
Result: Of the 200patients, 30 had preoperative BBB, 40 developed new BBB postoperatively. The event rate during follow-up was 1.5% in these without BBB and 18% in those with post-operative BBB. The adverse event rate was higher both in those with pre-existing and new postoperative BBB. Multivariate analysis indicated that a new, persistent postoperative BBB was an independent predictor of adverse. Events during follow up. The highest event rate occurred among those with new left BBB and left axis deviation after surgery. Most adverse events occurred during the first year of follow-up.
Conclusion: A new, persistent BBB acquired after aortic valve replacement surgery significantly increases the risk of adverse events, especially during the first postoperative year. Prophylactic pacemaker implantation should be considered for these patients after surgery.

Cardiac Surgery

Release kinetics of cardiac biomarkers in patients undergoing valve replacement surgery for rheumatic heart disease

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Background: Levels of brain natriuretic peptide (BNP) increase following CABG and predict post-operative outcomes. Release kinetics of BNP, Troponin-I (TnI) and CKMB after valve replacement are not well characterized.
Methods: We assessed levels of these biomarkers 24 hours prior and 6,24, 48 hrs, 1 month following mitral/aortic valve replacement in 50 patients (mean age 36.7 yrs, LVEF 54.4%, 80% males).
Results: Mean baseline BNP, TnI and CK-MB levels were 304.01 pg/ml, 0.03 ng/ml and 0.99 ng/ml. BNP initially decreased within 6 hours of surgery, and peaked at 24 hours; TnI and CKMB showed an early rise, with declining trends by 24 hrs. Peak BNP levels occurred in 90% patients by 24-48 hrs, while for TnI and CKMB this occurred in only 15-30%. Mean delta (peak-baseline) BNP, TnI, CKMB was 660.1pg/ml, 8.1ng/ml and 32.3ng/ml. At 1 month, levels of all biomarkers were not significantly different from baseline. Patients with higher baseline BNP more commonly had atrial fibrillation (71vs 33%, p=.02), higher right ventricular systolic pressure (69.7vs43.9 mm Hg, p< 0.001),higher Euroscore II(2.42vs1.49,p=0.006),longer inotrope duration (56.1vs26.5hrs, p=0.03), ventilator support time (35.6vs21.7 hrs, p=0.04), longer ICU (4.8vs3.2 days, p=0.02) and hospital stay (6.8vs5.2 days, p=0.03). Inotrope duration>42 hrs, ventilation time>29 hrs and ICU stay>4 days was seen in 42%vs19%, 30%vs9% and 33%vs14% respectively in patients with baseline BNP ≥/≤ 200 pg/ml. Only baseline BNP was a significant predictor of inotrope duration (p=0.01) and ventilation time (p=0.02). Only 24 hour post-operative BNP and delta BNP were predictors of inotrope duration>42 hrs, ventilation time>29 hrs and ICU stay>4 days.
Conclusion: Release kinetics of cardiac biomarkers following valve surgery are significantly different from each other. Of all the biomarkers, only BNP levels had an association with post-operative inotrope duration, ventilation time and ICU stay in patients undergoing valve replacement.

Miscellaneous

Clinical presentation and management strategies of tubercular pseudoaneyrsm arising from large arteries: A tertiary care centre experience

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Background: Tubercular pseudoaneurysm (PSA) is a rare but important complication of tuberculosis. Aortic pseudoaneurysm are the most commonly described while data on involvement of other large arteries being sparse.

Aims & methods: To discuss the clinical presentation and management strategies of tubercular PSA arising from large arteries other than aorta.
Methods: 26 consecutive cases of PSA of large arteries from January 2003 to December 2010 were analyzed. Out of which active tuberculosis was found as etiological cause in 4 patients (22 to 65 years). Arteries involved were Superficial femoral artery (SFA), Profunda femoris artery (PFA), and in two cases lobar branches of Pulmonary Artery (LPA). 3 patients had tubercular lymphadenitis in close vicinity to site of PSA, one patient presented with miliary tuberculosis, whereas both patients of LPA PSA had evidence of active/ treated pulmonary tuberculosis. Presentation was with Massive hemoptysis and new onset swelling in the groin. 2 patients deemed unfit for endovascular repair due to infection and skin necrosis underwent vascular surgery with venous interposition graft. 2 patients were treated via endovascular approach using PDA occluder device. All 4 patients received anti- tubercular therapy in the peri and post intervention period.
Results: All patients survived the intervention and were discharged from the hospital. At mean follow of 36 months (with maximum of 4 years) patients remained free from symptoms and repeat intervention.
Conclusions: High index of suspicion is needed to timely diagnose this rare and potentially fatal entity. A combination of chemotherapy and surgical/endovascular approach yields gratifying results in its management.

Profile and outcomes of cardiac tamponade: Experience from a tertiary care center

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Objectives: To evaluate the clinical profile, etiology and outcomes in patients with cardiac tamponade.
Methods: Data was collected retrospectively from 2009 until Aug 2012 and prospectively from Aug 2012 to Aug 2013.Only patients with significant pericardial effusion with tamponade were included. Demographic details, procedural details, complications and outcomes were recorded.
Results: Total of 92 patients were analysed. 55 were men (59.7%) & 37 were women (40.3%). Mean age was 34 yrs. Various etiologies were TB 23.9%(22), malignancy 16.3%(15), Procedure related 14%(13), Inconclusive 12%(11), Connective tissue disorders 8.6%(8), CKD 8.6%(8), hypothyroid 7.6%(7), pyogenic 5.4%(5), Post MI 2.1%(2) & Eosinophilic 1%(1). Pericardiocentesis was done bedside under echo guidance in 70 %(64) and under fluoroscopy guidance in 29 %(27). In 1 patient bedside procedure was unsuccessful and needed surgical assistance (0.01%). Based on etiology sub group analysis was done. Of the patients with TB etiology, 19 were men (86%). Mean age was 30 yrs. Mean ADA was 98.6 IU/dl. Mean duration of pigtail was 4.5 days & there were no deaths. Malignant effusion was seen in 15 patents.11 were men (73.3%). Mean age was 36yrs. Among those in the first decade 3 out of 5 had malignancy (60%). Of them, adenocarcinoma of lung was most common 40%(6). Others were lymphoma in 33.3%(5), ALL in 13%(2),breast carcinoma in 1%(1) and oesophageal Cancer in 1%(1).Pericardial fluid cytology showed malignant cells in 11 patients(73%). Mean ADA was 101 IU/dL. Mean duration of pigtail insertion was 5.8 days. Re positioning was needed in 3 patients. Re insertion was needed in 2 patients. No deaths occurred. Among the 13 procedure related causes of cardiac tamponade, 10 were men (76.9%). Mean age was 42.1yrs. Most common cause was post MVR 69.2%(9 patients-8 had anticoagulant induced bleed & 1 had infection with MRSA). Others were Post PTCA in 15.3%(2),Post PBMV in 7%(1) and ASD closure 7%(1). Death occurred in 4 patients (30%), of which 2 were post MVR and 2 were post PTCA patients. In 5 patients infective cause of tamponade was found. Mean age was 37.6 yrs. 3 were men (60%). Pyopericardium (MRSA culture positive) in 2 patients, myopericarditis in 2 patients and IE with Burkholderia cepacia with aortic root abscess in 1 patient. 2 patients died (40%). Overall mortality was 7 %(7 patients). Of these 4 were procedure related, 2 were pyogenic cause, 1 was in inconclusive group and none were pericardiocentesis related.
Conclusions: The most common cause of cardiac tamponade is Tuberculosis, followed closely by malignant effusions. Younger the age more was the chance of being malignant effusion. Overall mortality was 7%. Infective and post procedure associated cardiac tamponade showed highest mortality. Pericardiocentesis is a safe procedure whether done bedside or under fluoroscopic guidance.

Assessment of endothelial dysfunction in patients with chronic kidney disease and changes following renal transplantation

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Background: Endothelial function is an important antecedent for atherosclerosis. Patients with chronic kidney disease (CKD) have an increased cardiovascular risk and endothelial dysfunction has been postulated to explain this association. Whether endothelial function is different in patients with CKD managed medically or on dialysis and improves after renal transplantation (RT) needs further investigation.
Aims and objectives: To assess endothelial function patients with CKD on medical therapy and maintenance hemodialysis (HD) by imaging the brachial artery during reactive hyperemia (endothelium-dependent or flow mediated dilatation, FMD) and glyceryl trinitrate-induced dilatation (NMD, endothelium-independent dilation). Endothelial function was also assessed prior to RT and 3 months following RT.
Methods: A total of 103 patients of CKD were included (mean age 39.3±14.4 yrs, range 5-75 yrs). FMD and NMD were calculated as the percent change in diameter compared to baseline and impaired FMD was defined as values $< 4.5\%$.
Results: Hypertension was present in 94/103 (91.3%), diabetes mellitus in 24 (23.2%) and associated angiographic proven CAD in 7 (7.2%), mean echocardiographic LVEF was 55.9±10.8%. The mean Hb was 8.6±1.8 mg/dl while mean serum creatinine was 6.8±2.6 mg/dl and mean eGFR was 13.4+13.2 ml/min/1.73m^2, range 4.5-91.8.

At enrollment, 14 patients (14.4%) were on medical therapy, while 89 (85.6%) were on HD. During the study period, 74/89 (83%) underwent RT, and of these a follow up (post RT) assessment of FMD/NMD was performed in 40 patients.
Assessment of endothelial function: Endothelial dependent (FMD) was significantly lesser (mean 9.23±6.9%) as compared to NMD (19.8±9.4%, $p < 0.001$). An impaired FMD ($< 4.5\%$) was observed in 28/103(26.7%); in contrast, impaired NMD was observed less

commonly (only in 4.3%). There was no difference in mean FMD or NMD amongst males vs females, those aged </>30 years and those with/without diabetes. Mean FMD in patients on medical therapy was slightly lower as compared to patients on HD, although this was not statistically significant (8.7±8.8% vs 9.3±6.7%). The NMD values in these two groups were comparable. There was a significant improvement in mean FMD in patients following RT (10.5±7% to 14.4±7.2%, p=0.04). However mean NMD values did not change significantly following RT (20.6±8.2% to 22.5±9.2%, p=ns).

Conclusions: Patients with CKD frequently have endothelial dysfunction as evidenced by low FMD, while endothelium independent (NMD) is usually preserved. Patients of CKD on medical therapy had slightly lower FMD as compared to those on HD. Following RT, while NMD values did not change significantly, there was a significant improvement in FMD within 3 months of successful renal transplantation.

Procedural implications of persistent right innominate artery tortuosity during right transradial or trans ulnar coronary intervention – A prospective case controlled study

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Background: Increased tortuosity of innominate artery is sometimes encountered during right transradial (RTR) or transulnar (RTU) coronary interventional procedures. We named this sign as Tapan sign (TS). We conducted a multicenter prospective controlled study to evaluate the procedural implications of TS.

Methods: Between July 2012 & May 2013,all the patients undergoing RTR & RTU interventions were studied. Presence of TS was recognized by the M pattern or inverted W pattern of the guidewire or catheter during the passage of the catheter from right innominate artery to aorta (Group A). If the sign disappeared during deep inspiration the cases were excluded. The randomly selected angiographic procedure done by the same operator in the same cath lab on the same day, served as controls (Group B).Demographic variables, procedural time(PT),total fluoroscopy time(FT), dose area product(DAP), cumulative air kerma(AK) & contrast dosage(CD) utilized were noted in both Group A&B.

Results: 20 patients were identified with TS. In 2 cases the TS disappeared with inspiration. Complete data was not available in 2 (Group A 1, Group B 1). In 1 case control could't be found. The demographic variables were comparable between the groups (Group A, n=15, 3 RTR, mean age 65.86+8.17 yrs, 8 males, diabetes mellitus–3, hypertension–4, smoking–3, dyslipiaemia–4; Group B n=15,2 RTU, mean age 73.75+5.62 years, 7 males, diabetes mellitus–4, hypertension–3, smoking–4, dyslipiaemia–5). Femoral conversion was required in two patients in group A. The total PT was higher in Group A (42+13.2 min vs 25+11 min; p=0.032). The FT was 14.05+6.86 min versus 6.03+3.65 min (P=0.011). DAP was 105595.75+66413.76 mGy cm^2 versus 35001.25+36617.83 mGy Cm^2 (P=0.02), cumulate AK (mGyAK) was 1802.26+10.47.391 versus 710.69+590.65 (P=0.022) & the CD usage was 83.75+31.48 versus 56.25+11.87 ml (P=0.037) in group A & B respectively.

Conclusions: From this multicentre controlled study we conclude the presence of TS suggestive of tortuous right innominate artery during RTR or RTU interventional procedures is associated with significantly higher total PT, FT, radiation exposure & RC requirement. Switch over to a femoral approach would be the prudent approach in such cases.

Study of mitral valve apparatus in formalin fixed hearts with special reference to the scallops of posterior mitral leaflet

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Background: This study was conducted for detailed analysis of the anatomy of posterior mitral leaflet (PML) with special reference to scallops. The number and dimensions of the cusps and the scallops have a particular significance in Mitral valve prolapse and resultant regurgitation. Review of literature shows that anterior mitral leaflet (AML) is not divided into scallops. PML is divided into scallops and there are variations in the number and size of scallops of the PML.

Aims & objectives: 1) To study the anatomy of mitral valve complex in with special reference to scallops. 2) To measure average dimensions of valve structures including scallops.

Material & methods: Mitral valve structure including the length of leaflets, number of scallops on leaflets and the lengths of each scallop was noted in 40 formalin fixed hearts in the Department of Anatomy and the mean values were calculated. The presence of any accessory cusps was also noted. Hearts with any valvular pathology were excluded.

Results: In formalin fixed hearts, no accessory cusps were seen in mitral valve. Anterior mitral leaflet (AML) was not divided into scallops. Posterior mitral leaflet (PML) was found to have 2-4 scallops. 74% hearts had 3 scallops, 20% had 4 and 6% had 2 scallops in PML. Length of posteromedial commissural scallop was more in 2 scalloped PML (1.25 ± 0.07 cm in males and 1.30 ± 0.08 cm in females), length of middle commissural scallop was more in 3 scalloped PML (1.27 ± 0.18 cm in males and 1.24 ± 0.19 cm in females) & length of anterolateral commissural scallop was more in 4 scalloped PML (1.13 ± 0.34 cm in males and 1.13 ± 0.15 cm in females).

Conclusions: Normal human heart has scalloped PML. The number of scallops varies from 2-4, with 3 scalloped PML being the most common. All the dimensions of scallops were lesser as compared to western data.